immigration. Los Angeles, by contrast, is not growing "up"—in the sense of building New York-style high-rises—but it is becoming denser, for two reasons. First, suburban tract homes on the metropolitan fringe are built much more densely; although there are many six- and seven-unit-per-acre subdivisions, there are very few five-acre lots. Second, immigrant and non-Anglo populations, many of which have modest incomes, are increasing household sizes and doubling up in existing areas, thereby increasing the population density even though the physical fabric does not change much.

B. Atlanta and Phoenix

In many ways, Atlanta and Phoenix are "bookend" metropolitan areas—often mentioned in the same breath when discussing Sunbelt growth. Both are booming economically and both are experiencing population growth. Both are "young"—Phoenix quite literally (the metro area was less than 100,000 persons in 1950) and Atlanta more figuratively (as the prototypical "New South" metropolis that only began booming in the 1960s). Yet their growth patterns could not be more different.

In 1982, Atlanta had a metropolitan population of approximately 2.2 million persons using 701,000 acres of urbanized land—an overall metropolitan density of 3.20 persons per urbanized acre. Even at that time, Phoenix was a dramatically different place. Metro Phoenix had a population of 1.6 million people (72 percent of Atlanta's population) using only 272,000 acres of urbanized land (39 percent of Atlanta's urbanized land area), for an overall metropolitan density of 5.91 persons per urbanized acre.

Over the next 15 years, this pattern only became more pronounced. Atlanta and Phoenix added very close to the same population—1.36 million additional people in Atlanta, 1.18 million additional people in Phoenix. However, Atlanta urbanized five times as much land to accommodate this additional population as Phoenix did. To put it another way, Atlanta increased its urbanized land by 81 percent to accommodate a population growth of 61 percent. Phoenix increased its urbanized land by only 42 percent to accommodate a population of increase of 73 percent.

In 1997, therefore, the two metropolitan areas that often seem so similar were more different than ever. Atlanta had a metropolitan population of 3.6 million people and 1.27 million acres of urbanized land—a metropolitan density of 2.84 persons per urbanized acre. Phoenix, by contrast, had a metropolitan population of 2.79 million people (77 percent of Atlanta's population) and 387,000 urbanized acres (30 percent of Atlanta's urbanized area)—a metropolitan density of 7.20 persons per urbanized acre.

Phoenix's growth pattern bears a strong resemblance to Los Angeles's, with the exception that Phoenix has not been as heavily affected as Los Angeles by immigration and demographic change. It is worth noting, however, that this dramatic contrast between Phoenix and Atlanta has emerged even though Atlanta has consumed land far more efficiently than most smaller metropolitan areas in the South. It is also worth noting that a similar comparison could be made between Las Vegas and Charlotte, which have similar growth characteristics and almost exactly the same set of differences.

C. Sacramento and Columbus

Sacramento, California, and Columbus, Ohio, provide an interesting case study that also reveals the dramatic difference in metropolitan growth patterns between the West and the Midwest.

Sacramento and Columbus are similar in many ways. Both are state capitals of large urban states, yet they lie in the center of major agricultural belts. Both are also home to major universities (Ohio State and UC Davis). Both are growing in population and booming economically, thanks in large part to the high-tech industry's desire to exploit a well-educated labor pool that has developed because of both the capital and the university. Furthermore, in 1982—the beginning of our study period—they had almost exactly the same metropolitan population: slightly over 1 million people.

Of course, Sacramento and Columbus are located in two regions of the country with vastly different metropolitan growth patterns. But in relation to their surrounding regions, both metropolitan areas have atypical growth patterns that ought to make them more similar to one another. Sacramento is sprawling in comparison to most other California metro areas, while Columbus is growing compactly compared to most other metro areas in the Midwest.

Yet Sacramento and Columbus have very different metropolitan growth patterns—and those differences only became more striking between 1982 and 1997.

In 1982, Sacramento was already much more densely developed than Columbus. At that time, Sacramento had a population of 1.17 million persons using 205,000 acres of urbanized land—an average of 5.69 persons per urbanized acre. Columbus in 1982 had a very similar population—1.26 million people. But that population used 316,000 acres of urbanized land. Columbus's metropolitan density in 1982 was 3.99 persons per urbanized acre. In other words, Sacramento in 1982 was about 50 percent more densely developed than Columbus.

Over the next 15 years, the discrepancy grew noticeably—even though Sacramento dropped in overall population density and sprawled far more than most other California metro areas, including the neighboring farming areas of Stockton and Modesto.

Between 1982 and 1997, Columbus and Sacramento urbanized almost

exactly the same amount of previously non-urban land—about 114,000 acres for Columbus and about 102,000 acres for Sacramento. But Sacramento accommodated more than double the population growth, adding 533,000 new residents to only 258,000 for Columbus. In other words, Sacramento grew at a "marginal" population density of 5.23 persons per acre (almost the same as its historical density), while Columbus grew at a marginal density of 2.27 persons per acre, or less than 60 percent of its historical density.

At the end of the 15-year study period, Sacramento was accommodating a slightly greater metropolitan population than Columbus on only about 70 percent of the land. In 1997, Columbus had a population of about 1.52 million people using about 430,000 acres of urbanized land, for an overall density of 3.53 persons per urbanized acre (a figure just slightly lower than the national average). But Sacramento had a population of about 1.70 persons using about 307,000 acres of urbanized land, for an overall density of 5.53 persons per urbanized acre.

V. Conclusion

In closing, it is important to reiterate that overall land consumption is just one way to measure "sprawl." Many other definitions exist, including automobile orientation and issues associated with connectedness and contiguity of urban areas. Nevertheless, the efficient utilization of land resources is also a commonly accepted definition (or at least a component) of sprawl. It is especially significant to note that the goal of efficient land utilization is being achieved in one region of the country that is commonly perceived to be sprawling—the West—but not in those parts of the nation that are commonly perceived not to have a sprawl problem—the Northeast and the Midwest.

This strongly suggests that different parts of the country should approach sprawl as a policy issue in different ways. The West may be more responsive to urban design solutions that seek to cluster density and mix commercial with residential development to create more efficient activity patterns as well as more efficient use of land. The rest of the country, especially the South, may be better off focusing on containment strategies and other efforts to stem the apparent trend of extremely low-density development on the metropolitan fringe. The Northeast and Midwest may also reduce their trend toward sprawl without population growth by redeveloping disused and sometimes contaminated industrial sites and rebuilding established neighborhoods that have declined.

Demography and growth rates together have a large influence on metropolitan density, and are somewhat susceptible to policy actions. Fast-growth regions with high proportions of foreign-born residents grew more densely in the 1980s and 1990s than moderately or slowly growing regions with low proportions of foreign-born residents. "White flight" also seems to be a factor in density change; regions with high proportions of black or Hispanic residents lost density faster than those with lower proportions of these minority groups.

Although growth rates and minority composition are difficult to influence with local or regional policy, some declining cities have begun to study the possibility of attracting foreign-born immigrants to their thinning neighborhoods. It is difficult to determine from our results whether such efforts will result in higher overall density; our findings may be an indication that immigrants are attracted to high-density regions, rather than that foreign-born residents cause density to increase. But there is a plausible scenario in which immigration does spur increased density. In the first round, foreign-born residents move into and begin to invest in formerly disused neighborhoods. As the enclave expands and consolidates, property values within the neighborhoods in high demand begin to stabilize and rise. Next, outsiders identify new markets in the central city for additional investment. As a consequence of all these changes, the impression that central cities are not good places to do business or live begins to fade.

Regional density also relates to infrastructure. Metropolitan areas in which many residents have public water but no public sewers could probably increase the density in already-developed areas by shifting toward public sewers. Unfortunately for these regions, the era of huge federal subsidies to sewage plant construction ended over 20 years ago. Without such subsidies from the federal or state government, it is unlikely that municipal governments that already feel little compunction to accommodate higher density development will tax their residents to build sewers. On the other hand, researchers have been making huge progress in developing new septic-system technologies that require much smaller lots. States have been slow to accept these technologies.

A final area that may respond to policy change is regional fragmentation. Dissolution of municipal boundaries seems politically unlikely. But stronger efforts to promote regional cooperation would probably help reduce some of the pressure that seems most likely to promote low-density development in fragmented regions. Fair-share housing programs could assure that more local governments accommodate high-density and affordable housing; tax-base sharing could be designed to reduce the incentives for municipalities to compete over new commercial and industrial development.

Endnotes

1 William Fulton is President of the Solimar Research Group. Rolf Pendall is an Assistant Professor in the Department of City & Regional Planning at Cornell University and a Senior Research Associate at the Solimar Research Group. Mai Nguyen is a Ph.D. student in the Department of Urban Planning at the University of California, Irvine, and a Research Associate at the Solimar Research Group. Alicia Harrison is a Research Associate at the Solimar Research Group.

2 Honolulu, of course, is atypically land-constrained for U.S. metropolitan areas because it is located on an island in the Pacific Ocean. The other major non-continental metropolitan area, Anchorage, Alaska, is not included in this study because NRI does not compile data about Alaska.

3 The extremely large drops in density in Pueblo and Las Cruces suggest a sampling error might be at work. Nevertheless, even if such a sampling error were factored in, it is almost certainly true that the metro density in these metro areas dropped considerably.

4 By "associated significantly," we mean at levels of statistical significance above 90 percent confidence level.

5 This discussion is based on the Consolidated Metropolitan Statistical Area—five counties for Los Angeles and 31 counties (in three states) for New York. The profile of the Primary Metropolitan Statistical Area looks quite different.

6 For a detailed description of sampling technique, see Fuller, Wayne A. (1999). Estimation Procedures for the United States National Resources Inventory. 1999 Proceeding of Survey Methods Section of the Statistical Society of Canada.

Appendix A: Methodology

The data used in this study were obtained from a variety of sources. The main variable of concern, density, was derived using data from the United States National Resources Inventory (NRI) for 1982, 1987, 1992, and 1997 along with population data from the U.S. Census Bureau. The NRI is a national longitudinal panel survey of land use that allows for analyses of changing trends over a 15-year period. The sample is a stratified two-stage sample of non-federal land in the U.S. and Puerto Rico.[6] This study only examines states in the U.S. and omits Alaska because the NRI has not yet reported on Alaska. As a sample, the NRI is subject to all the typical errors of sampling. The amount of urbanized land we report here is an estimate. The estimates are probably more accurate in counties with more land area, in metropolitan areas with multiple counties, and in metropolitan areas with more urban land use. We have not computed standard errors or confidence intervals around these estimates because the USDA has not yet released software that would make their computation feasible. Future releases of this report will, however, include standard errors and confidence intervals around the estimates.

In this study, density is measured as population divided by urban area. The NRI defines urban areas as follows:

> Urban and built-up areas. A Land cover/use category consisting of residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; other land used for such purposes; small parks (less than ten acres) within urban and built-up areas; and highways, railroads, and other transportation facilities if they are surrounded by urban areas. Also included are tracts of less than ten acres that do not meet the above definition but are completely surrounded by urban and built-up land. Two size categories are recognized in the NRI: areas of 0.25 acre to ten acres, and areas of at least ten acres.

For additional information on the NRI, please refer to the NRI web site, **http://www.nhq.nrcs.usda.gov/NRI/1997/.**

The U.S. Census, by contrast, defines urban areas on the basis of a minimum population density:

> The Census Bureau delineates urbanized areas (UA's) to provide a better separation of urban and rural territory, population, and housing in the vicinity of large places. A UA comprises one or more places ("central place") and the adjacent densely settled surrounding territory ("urban fringe") that together have a minimum of 50,000 persons. The urban fringe generally consists of contiguous territory having a density of at least 1,000 persons per square mile. The urban fringe also includes outlying territory of such density if it was connected to the core of the contiguous area by road and is within 1 1/2 road miles of that core, or within five road miles of the core but separated by water or other undevelopable territory. Other territory with a population density of fewer than 1,000 people per square mile is included in the urban fringe if it eliminates an enclave or closes an indentation in the boundary of the urbanized area. The population density is determined by (1) outside of a place, one or more contiguous census blocks with a

population density of at least 1,000 persons per square mile or (2) inclusion of a place containing census blocks that have at least 50 percent of the population of the place and a density of at least 1,000 persons per square mile (**http://www.census.gov/population/censusdata/urdef.txt**).

Because the Census definition of urban areas includes a density threshold, the Census excludes some areas that would be identified as urban by the NRI. The NRI would also exclude certain areas—especially large parks within urban areas—that the Census incorporates within urban areas. On net, however, the NRI finds more urban acreage than the Census.

We used two different sources to estimate population. The U.S. Census produces annual intercensal estimates of population; we used these estimates for the population of counties in 1982 and 1992 (**http://www.census.gov/population/estimates/county/e8089co.zip**). The 1992 and 1997 estimates appear to understate the population of many counties. The 2000 census results suggested that the Bureau's estimates of undocumented immigration were too low, and that the estimated 1990 census undercount may have been underestimated. The Bureau does not expect to release revised intercensal estimates for the 1990s until at least 2002. We therefore produced our own population estimates for 1992 and 1997 by doing a straight-line interpolation between 1990 and 2000. This interpolation would have introduced additional error into our density estimates if a county's growth rate in the first half of the decade was dramatically different from that in the second half of the decade.

We calculated density values for every Consolidated Metropolitan Statistical Area (CMSA) or Metropolitan Statistical Area (MSA) in the U.S., according to 1990 census boundary definitions, for the years 1982, 1987, 1992 and 1997. To explain differences among metropolitan areas' density, density change, and urbanized land change, we estimated ordinary least squares multiple regression analyses using the backwards stepwise method. Each regression analysis was conducted in a similar manner, starting with all variables we thought might be relevant regressed on each dependent variable. Then, we removed insignificant variables one at a time, re-running the analysis, until only statistically significant variables remained in the model. In the end, there were 11 significant variables in the density 1997 model, 12 in density change 1982–1997, and nine in urbanization change 1982–1997.

In these regressions, we used Primary Metropolitan Statistical Area (PMSA) or Metropolitan Statistical Area (MSA) boundaries. PMSAs are constituents of CMSAs. For instance, the New York-Northern New Jersey-Long Island CMSA includes the Bergen-Passaic, Jersey City, Middlesex-Somerset-Hunterdon, Monmouth-Ocean, Nassau-Suffolk, New York, Newark, and Orange County PMSAs. Each of these PMSAs is undergoing density change that responds not only to conditions throughout the New York CMSA but also—and perhaps more importantly—those in their smaller sub-region. The rest of the report (e.g. the Case Studies) is based on data at the CMSA level.

Appendix B. Change in Population, Urbanized Land and Density in 281 U.S. Metropolitan Areas, 1982–1997

U.S. Census Designated Region	Density 1997	Change in Population 1982–1997	Change in Urbanized Land 1982–1997	Change in Density 1982–1997
Midwest	3.39	7.06%	32.23%	-19.03%
Northeast	4.51	6.91%	39.10%	-23.14%
South	2.82	22.23%	59.61%	-23.42%
West	4.85	32.21%	48.94%	-11.23%
United States	3.55	17.02%	47.14%	-20.47%

Metropolitan Statistical Area	Region*	Density 1997	Change in Population 1982–1997	Change in Urbanized Land 1982–1997	Change in Density 1982–1997
Anderson, IN	MW	3.25	-1.6%	13.0%	-13.0%
Appleton-Oshkosh-Neenah, WI	MW	3.18	18.0%	35.6%	-13.0%
Battle Creek, MI	MW	2.74	-1.8%	17.3%	-16.3%
Benton Harbor, MI	MW	2.74	-2.8%	27.9%	-24.0%
Bismarck, ND	MW	2.30	11.4%	36.0%	-18.0%
Bloomington, IN	MW	2.86	15.1%	33.2%	-13.6%
Bloomington-Normal, IL	MW	4.15	19.7%	64.5%	-27.2%
Canton, OH	MW	3.41	0.4%	25.7%	-20.2%
Cedar Rapids, IA	MW	3.68	10.6%	22.1%	-9.4%
Champaign-Urbana-Rantoul, IL	MW	5.32	3.5%	34.1%	-22.8%
Chicago-Gary-Lake County, IL-IN-WI	MW	6.02	9.6%	25.5%	-12.7%
Cincinnati-Hamilton, OH-KY-IN	MW	3.77	10.4%	40.1%	-21.2%
Cleveland-Akron-Lorain, OH	MW	4.03	0.4%	31.7%	-23.8%
Columbia, MO	MW	2.82	24.8%	47.2%	-15.3%
Columbus, OH	MW	3.53	20.5%	36.0%	-11.4%
Davenport-Rock Island-Moline, IA-IL	MW	3.01	-6.8%	10.5%	-15.7%
Dayton-Springfield, OH	MW	3.64	1.8%	17.9%	-13.6%
Decatur, IL	MW	2.95	-10.1%	25.3%	-28.3%
Des Moines, IA	MW	4.26	18.6%	35.3%	-12.3%
Detroit-Ann Arbor, MI	MW	4.27	5.0%	29.0%	-18.7%
Dubuque, IA	MW	3.09	-4.0%	11.3%	-13.7%
Duluth, MN-WI	MW	2.32	-7.5%	30.7%	-29.2%
Eau Claire, WI	MW	2.51	8.5%	29.9%	-16.5%
Elkhart-Goshen, IN	MW	2.99	26.5%	36.4%	-7.2%
Evansville-Henderson, IN-KY	MW	3.35	4.8%	22.1%	-14.2%
Fargo-Moorhead, ND-MN	MW	4.06	19.8%	15.3%	3.9%
Flint, MI	MW	2.97	-0.6%	21.4%	-18.1%
Fort Wayne, IN	MW	3.63	12.3%	39.5%	-19.5%
Grand Forks, ND	MW	3.21	-0.1%	8.8%	-8.2%
Grand Rapids, MI	MW	3.32	26.9%	45.2%	-12.6%
Green Bay, WI	MW	3.08	21.7%	33.8%	-9.0%
Indianapolis, IN	MW	3.58	19.7%	41.8%	-15.5%
Iowa City, IA	MW	3.73	25.9%	45.9%	-13.7%
Jackson, MI	MW	2.52	3.7%	23.3%	-15.9%
Janesville-Beloit, WI	MW	2.52	7.7%	28.0%	-15.9%
Joplin, MO	MW	2.92	16.5%	40.6%	-17.1%
Kalamazoo, MI	MW	3.52	9.7%	30.2%	-15.8%
Kankakee, IL	MW	3.75	0.3%	34.8%	-25.6%
Kansas City, MO-KS	MW	3.78	17.5%	36.8%	-14.1%
Kokomo, IN	MW	4.21	-1.3%	20.2%	-17.9%
La Crosse, WI	MW	3.95	12.7%	17.3%	-4.0%
Lafayette-West Lafayette, IN	MW	3.34	15.5%	38.4%	-16.5%
Lansing-East Lansing, MI	MW	3.40	6.8%	50.3%	-28.9%
Lawrence, KS	MW	3.39	35.1%	38.1%	-2.2%
Lima, OH	MW	2.81	1.4%	42.6%	-28.9%
Lincoln, NE	MW	3.36	21.2%	13.0%	7.2%
Little Rock-North Little Rock, AR	MW	2.73	17.0%	39.3%	-16.0%
Madison, WI	MW	4.89	24.2%	32.1%	-6.0%
Mansfield, OH	MW	2.58	-0.9%	24.6%	-20.4%
Milwaukee-Racine, WI	MW	3.93	6.5%	24.9%	-14.7%
Minneapolis-St. Paul, MN-WI	MW	3.85	25.1%	61.1%	-22.4%
Muncie, IN	MW	3.65	-5.4%	53.1%	-38.2%
Muskegon, MI	MW	2.92	6.9%	28.5%	-16.9%
Omaha, NE-IA	MW	4.11	13.2%	25.3%	-9.7%
Peoria, IL	MW	2.86	-4.7%	24.3%	-23.4%
Rapid City, SD	MW	1.76	19.6%	58.7%	-24.7%
Rochester, MN	MW	2.91	26.2%	35.4%	-6.8%
Rockford, IL	MW	3.52	10.9%	31.0%	-15.4%
Saginaw-Bay City-Midland, MI	MW	3.54	-3.0%	31.8%	-26.4%
Sheboygan, WI	MW	2.89	9.2%	33.2%	-18.0%
Sioux City, IA-NE	MW	3.26	3.3%	14.8%	-10.0%
Sioux Falls, SD	MW	2.55	26.5%	35.3%	-6.5%
South Bend-Mishawaka, IN	MW	4.16	8.9%	35.9%	-19.8%

Metropolitan Statistical Area	Region*	Density 1997	Change in Population 1982–1997	Change in Urbanized Land 1982–1997	Change in Density 1982–1997
Springfield, IL	MW	4.16	5.9%	27.3%	-16.8%
Springfield, MO	MW	2.92	32.4%	37.2%	-3.5%
St. Cloud, MN	MW	3.00	30.7%	73.7%	-24.8%
St. Joseph, MO	MW	2.77	-1.3%	18.5%	-16.8%
St. Louis, MO-IL	MW	3.89	6.0%	25.1%	-15.3%
Steubenville-Weirton, OH-WV	MW	3.01	-15.8%	34.4%	-37.4%
Terre Haute, IN	MW	3.57	-3.0%	16.4%	-16.6%
Toledo, OH	MW	3.74	0.3%	30.0%	-22.8%
Topeka, KS	MW	3.17	7.1%	38.6%	-22.8%
Waterloo-Cedar Falls, IA	MW	3.33	-7.2%	13.1%	-17.9%
Wausau, WI	MW	3.15	10.5%	26.2%	-12.4%
Wichita, KS	MW	3.02	15.7%	37.4%	-15.8%
Youngstown-Warren, OH	MW	3.20	-7.0%	25.1%	-25.7%
Albany-Schenectady-Troy, NY	NE	3.51	5.8%	34.7%	-21.4%
Allentown-Bethlehem, PA-NJ	NE	3.06	13.0%	61.2%	-29.9%
Altoona, PA	NE	3.72	-4.5%	42.0%	-32.7%
Atlantic City, NJ	NE	3.52	22.2%	66.5%	-26.6%
Bangor, ME	NE	3.57	5.4%	46.9%	-28.3%
Binghamton, NY	NE	3.68	-3.0%	33.3%	-27.3%
Boston-Lawrence-Salem-Lowell-Brockton, MA	NE	5.65	6.7%	46.9%	-27.4%
Buffalo-Niagara Falls, NY	NE	5.74	-3.9%	13.0%	-15.0%
Burlington, VT	NE	3.66	20.6%	50.4%	-19.8%
Elmira, NY	NE	4.16	-3.9%	32.9%	-27.7%
Erie, PA	NE	2.87	-0.7%	49.9%	-33.8%
Glens Falls, NY	NE	2.47	11.7%	37.7%	-18.9%
Harrisburg-Lebanon-Carlisle, PA	NE	3.18	9.9%	62.4%	-32.4%
Hartford-New Britain-Middletown-Bristol, CT	NE	4.16	7.6%	20.4%	-10.6%
Jamestown-Dunkirk, NY	NE	4.14	-4.1%	13.0%	-15.1%
Johnstown, PA	NE	2.44	-9.4%	53.0%	-40.8%
Lancaster, PA	NE	3.10	23.0%	45.9%	-15.7%
Lewiston-Auburn, ME	NE	2.30	5.4%	43.2%	-26.4%
Manchester-Nashua, NH	NE	3.13	27.9%	69.5%	-24.6%
New Bedford-Fall River-Attleboro, MA	NE	4.02	10.3%	45.1%	-24.0%
New Haven-Waterbury-Meriden, CT	NE	5.09	7.0%	19.2%	-10.3%
New London-Norwich, CT	NE	4.10	6.1%	21.4%	-12.6%
New York-Northern New Jersey-Long Island, NY-NJ-CT	NE	7.99	6.1%	20.5%	-15.4%
Philadelphia-Wilmington-Trenton, PA-NJ-DE-MD	NE	5.03	7.0%	35.6%	-21.1%
Pittsburgh-Beaver Valley, PA	NE	3.72	-8.0%	42.6%	-35.5%
Pittsfield, MA	NE	3.43	-4.1%	31.9%	-27.3%
Portland, ME	NE	2.68	17.4%	108.4%	-43.7%
Portsmouth-Dover-Rochester, NH	NE	2.85	31.6%	76.5%	-25.4%
Poughkeepsie, NY	NE	3.04	11.1%	10.0%	1.0%
Providence-Pawtucket-Woonsocket, RI	NE	5.93	9.0%	22.2%	-10.9%
Reading, PA	NE	3.48	15.2%	50.4%	-23.4%
Rochester, NY	NE	4.41	4.5%	21.7%	-14.1%
Scranton—Wilkes-Barre, PA	NE	2.43	4.1%	55.0%	-32.8%
Sharon, PA	NE	2.33	-5.2%	52.5%	-37.9%
Springfield, MA	NE	3.84	4.5%	41.6%	-26.2%
State College, PA	NE	2.83	15.2%	55.1%	-25.7%
Syracuse, NY	NE	3.57	2.0%	43.0%	-28.7%
Utica-Rome, NY	NE	3.40	-4.7%	47.9%	-35.5%
Williamsport, PA	NE	3.58	2.0%	53.2%	-33.5%
Worcester-Fitchburg-Leominster, MA	NE	3.97	13.8%	53.0%	-25.6%
York, PA	NE	2.83	18.1%	77.7%	-33.5%
Abilene, TX	S	3.69	4.3%	37.6%	-24.2%
Albany, GA	S	2.17	2.7%	52.9%	-32.8%
Alexandria, LA	S	3.20	-5.7%	39.9%	-32.6%
Amarillo, TX	S	2.30	15.4%	33.1%	-13.3%
Anderson, SC	S	1.75	16.6%	44.1%	-19.1%
Anniston, AL	S	2.75	-7.1%	71.7%	-45.9%
Asheville, NC	S	2.81	20.3%	87.4%	-35.8%
Athens, GA	S	2.43	35.4%	101.6%	-32.8%
Atlanta, GA	S	2.84	60.8%	81.5%	-11.4%
Augusta, GA-SC	S	2.20	23.3%	55.6%	-20.8%
Austin, TX	S	3.12	80.3%	55.4%	16.0%
Baltimore, MD	S	4.81	12.7%	32.3%	-14.8%
Baton Rouge, LA	S	3.24	11.9%	36.6%	-18.1%
Beaumont-Port Arthur, TX	S	1.65	-2.1%	33.3%	-26.5%
Biloxi-Gulfport, MS	S	1.90	17.0%	20.3%	-2.8%
Birmingham, AL	S	2.82	9.9%	50.6%	-27.1%
Bradenton, FL	S	3.08	51.8%	56.3%	-2.9%
Brownsville-Harlingen, TX	S	4.48	35.5%	51.7%	-10.7%
Bryan-College Station, TX	S	2.84	27.5%	51.2%	-15.7%

Metropolitan Statistical Area	Region*	Density 1997	Change in Population 1982-1997	Change in Urbanized Land 1982-1997	Change in Density 1982-1997
Burlington, NC	S	2.49	22.8%	28.9%	-4.8%
Charleston, SC	S	3.32	18.3%	55.3%	-23.8%
Charleston, WV	S	3.05	-6.6%	58.9%	-41.2%
Charlotte-Gastonia-Rock Hill, NC-SC	S	2.41	38.8%	73.9%	-20.2%
Charlottesville, VA	S	2.19	29.4%	53.7%	-15.8%
Chattanooga, TN-GA	S	2.48	8.5%	52.7%	-29.0%
Clarksville-Hopkinsville, TN-KY	S	3.31	25.0%	71.6%	-27.1%
Columbia, SC	S	2.64	22.1%	79.9%	-32.1%
Columbus, GA-AL	S	3.48	2.5%	53.4%	-33.2%
Corpus Christi, TX	S	2.89	8.0%	41.1%	-23.4%
Cumberland, MD-WV	S	2.55	-5.0%	31.3%	-27.6%
Dallas-Fort Worth, TX	S	3.78	49.1%	54.4%	-3.5%
Danville, VA	S	2.28	-1.0%	41.5%	-30.0%
Daytona Beach, FL	S	2.84	49.5%	75.2%	-14.7%
Decatur, AL	S	1.77	16.9%	139.1%	-51.1%
Dothan, AL	S	3.09	8.2%	40.1%	-22.8%
El Paso, TX	S	5.27	27.6%	39.2%	-8.3%
Enid, OK	S	2.92	-15.0%	15.9%	-26.6%
Fayetteville, NC	S	4.15	17.1%	59.6%	-26.6%
Fayetteville-Springdale, AR	S	4.38	42.3%	63.4%	-12.9%
Florence, AL	S	2.26	3.2%	24.6%	-17.2%
Florence, SC	S	2.70	9.8%	58.9%	-30.9%
Fort Myers-Cape Coral, FL	S	2.03	77.2%	53.8%	15.2%
Fort Pierce, FL	S	2.17	72.2%	32.6%	29.9%
Fort Smith, AR-OK	S	2.88	21.0%	56.0%	-22.4%
Fort Walton Beach, FL	S	2.87	39.3%	106.6%	-32.5%
Gadsden, AL	S	2.42	-0.1%	39.6%	-28.5%
Gainesville, FL	S	2.54	28.7%	33.6%	-3.7%
Greensboro—Winston-Salem—High Point, NC	S	2.74	22.7%	54.2%	-20.4%
Greenville-Spartanburg, SC	S	2.36	21.7%	74.4%	-30.2%
Hagerstown, MD	S	3.30	14.7%	41.3%	-18.8%
Hickory-Morganton, NC	S	1.55	21.6%	33.8%	-9.1%
Houma-Thibodaux, LA	S	3.58	1.4%	41.3%	-28.2%
Houston-Galveston-Brazoria, TX	S	3.47	25.9%	37.6%	-8.5%
Huntington-Ashland, WV-KY-OH	S	3.28	-5.6%	37.8%	-31.5%
Huntsville, AL	S	3.24	30.9%	99.5%	-34.4%
Jackson, MS	S	3.14	15.4%	39.0%	-17.0%
Jackson, TN	S	3.40	15.3%	44.9%	-20.4%
Jacksonville, FL	S	3.16	38.5%	61.1%	-14.0%
Jacksonville, NC	S	3.26	26.3%	64.6%	-23.3%
Johnson City-Kingsport-Bristol, TN-VA	S	2.53	6.4%	58.8%	-33.0%
Killeen-Temple, TX	S	3.17	30.5%	68.3%	-22.5%
Knoxville, TN	S	2.40	17.1%	70.9%	-31.5%
Lafayette, LA	S	3.30	10.9%	64.5%	-32.6%
Lake Charles, LA	S	3.30	2.9%	41.4%	-27.3%
Lakeland-Winter Haven, FL	S	2.28	35.4%	92.6%	-29.7%
Laredo, TX	S	4.67	57.6%	78.6%	-11.7%
Lawton, OK	S	3.42	-4.6%	36.5%	-30.1%
Lexington-Fayette, KY	S	3.40	21.1%	68.2%	-28.0%
Longview-Marshall, TX	S	2.10	3.0%	74.8%	-41.0%
Louisville, KY-IN	S	3.43	5.6%	57.4%	-32.9%
Lubbock, TX	S	3.88	9.7%	29.5%	-15.3%
Lynchburg, VA	S	2.54	2.7%	34.3%	-23.5%
Macon-Warner Robins, GA	S	2.19	12.8%	119.6%	-48.6%
McAllen-Edinburg-Mission, TX	S	4.41	64.0%	97.0%	-16.7%
Melbourne-Titusville-Palm Bay, FL	S	3.26	51.5%	81.9%	-16.7%
Memphis, TN-AR-MS	S	3.50	17.1%	67.3%	-30.0%
Miami-Fort Lauderdale, FL	S	7.93	30.9%	36.2%	-3.9%
Midland, TX	S	1.67	14.7%	45.4%	-21.1%
Mobile, AL	S	2.69	14.0%	27.0%	-10.2%
Monroe, LA	S	2.57	3.0%	42.4%	-27.6%
Montgomery, AL	S	2.89	16.1%	32.2%	-12.2%
Naples, FL	S	2.65	121.8%	153.3%	-12.4%
Nashville, TN	S	2.72	33.4%	103.0%	-34.3%
New Orleans, LA	S	5.64	-1.4%	25.0%	-21.1%
Norfolk-Virginia Beach-Newport News, VA	S	4.22	23.2%	52.3%	-19.1%
Ocala, FL	S	1.23	74.5%	61.4%	8.1%
Odessa, TX	S	1.76	-11.1%	21.6%	-26.9%
Oklahoma City, OK	S	2.99	13.2%	48.5%	-23.8%
Orlando, FL	S	4.07	73.5%	92.2%	-9.7%
Owensboro, KY	S	5.07	3.9%	52.1%	-31.7%
Panama City, FL	S	2.02	36.5%	67.1%	-18.3%
Parkersburg-Marietta, WV-OH	S	2.75	-4.0%	40.6%	-31.8%
Pascagoula, MS	S	2.24	4.4%	30.1%	-19.8%
Pensacola, FL	S	2.58	28.9%	61.7%	-20.3%

B

Metropolitan Statistical Area	Region*	Density 1997	Change in Population 1982–1997	Change in Urbanized Land 1982–1997	Change in Density 1982–1997
Pine Bluff, AR	S	2.68	-5.5%	25.9%	-24.9%
Raleigh-Durham, NC	S	2.66	60.0%	93.8%	-17.4%
Richmond-Petersburg, VA	S	2.82	23.2%	70.0%	-27.6%
Roanoke, VA	S	3.84	4.9%	24.5%	-15.7%
San Angelo, TX	S	2.32	-12.6%	25.6%	-10.3%
San Antonio, TX	S	4.53	30.6%	40.9%	-7.4%
Sarasota, FL	S	2.59	40.9%	36.2%	3.4%
Savannah, GA	S	2.66	14.4%	48.4%	-22.9%
Sherman-Denison, TX	S	1.91	15.3%	70.5%	-32.4%
Shreveport, LA	S	3.09	0.5%	24.9%	-19.6%
Tallahassee, FL	S	2.95	35.0%	92.8%	-30.0%
Tampa-St. Petersburg-Clearwater, FL	S	3.86	33.4%	50.5%	-11.4%
Texarkana, TX-Texarkana, AR	S	1.74	9.9%	12.8%	-2.6%
Tulsa, OK	S	2.79	10.9%	30.4%	-15.0%
Tuscaloosa, AL	S	2.74	16.8%	101.7%	-42.1%
Tyler, TX	S	1.99	22.1%	97.0%	-38.0%
Victoria, TX	S	1.74	9.4%	30.9%	-16.4%
Waco, TX	S	3.83	17.4%	22.0%	-3.8%
Washington, DC-MD-VA	S	5.88	29.7%	47.0%	-11.8%
West Palm Beach-Boca Raton-Delray Beach, FL	S	3.47	62.7%	47.4%	10.4%
Wheeling, WV-OH	S	3.41	-15.0%	32.0%	-35.6%
Wichita Falls, TX	S	2.71	3.0%	26.3%	-18.5%
Wilmington, NC	S	2.61	38.0%	71.9%	-19.7%
Albuquerque, NM	W	3.13	23.2%	85.1%	-33.5%
Bakersfield, CA	W	3.84	44.4%	123.6%	-35.4%
Bellingham, WA	W	3.20	41.2%	45.8%	-3.2%
Billings, MT	W	2.01	10.2%	46.9%	-25.0%
Boise City, ID	W	3.32	50.9%	112.4%	-29.0%
Bremerton, WA	W	3.70	41.4%	73.1%	-18.3%
Casper, WY	W	3.12	-15.8%	13.0%	-25.5%
Cheyenne, WY	W	1.70	11.2%	32.1%	-15.8%
Chico, CA	W	5.28	29.6%	49.8%	-13.5%
Colorado Springs, CO	W	2.95	44.7%	72.0%	-15.9%
Denver-Boulder, CO	W	4.47	30.1%	42.9%	-9.0%
Eugene-Springfield, OR	W	3.40	14.2%	20.4%	-5.2%
Fort Collins-Loveland, CO	W	3.48	47.3%	39.6%	5.5%
Fresno, CA	W	4.95	40.3%	40.6%	-0.2%
Great Falls, MT	W	3.13	-0.3%	17.1%	-14.8%
Greeley, CO	W	5.33	32.2%	13.9%	16.1%
Honolulu, HI	W	12.36	11.4%	19.1%	-6.5%
Las Cruces, NM**	W	2.79	57.5%	784.9%	-82.2%
Las Vegas, NV	W	6.67	130.8%	53.1%	50.8%
Los Angeles-Anaheim-Riverside, CA	W	8.31	31.2%	27.6%	2.8%
Medford, OR	W	2.64	27.6%	25.1%	2.0%
Merced, CA	W	4.95	40.7%	72.0%	-18.2%
Modesto, CA	W	7.31	51.1%	53.0%	-1.3%
Olympia, WA	W	2.55	46.5%	79.9%	-18.6%
Phoenix, AZ	W	7.20	72.9%	41.8%	21.9%
Portland-Vancouver, OR-WA	W	5.10	32.0%	48.9%	-11.3%
Provo-Orem, UT	W	7.78	44.9%	80.4%	-19.7%
Pueblo, CO**	W	4.37	85.0%	763.9%	-87.4%
Redding, CA	W	1.82	30.3%	70.5%	-23.6%
Reno, NV	W	7.99	50.6%	50.6%	0.0%
Richland-Kennewick-Pasco, WA	W	1.90	17.1%	67.1%	-29.9%
Sacramento, CA	W	5.55	45.7%	49.9%	-2.8%
Salem, OR	W	3.93	28.1%	45.9%	-12.2%
Salinas-Seaside-Monterey, CA	W	7.08	26.7%	28.3%	-1.3%
Salt Lake City-Ogden, UT	W	5.00	29.9%	50.4%	-13.6%
San Diego, CA	W	7.50	37.9%	44.1%	-4.3%
San Francisco-Oakland-San Jose, CA	W	7.96	22.7%	27.6%	-3.9%
Santa Barbara-Santa Maria-Lompoc, CA	W	5.65	24.7%	47.0%	-15.2%
Santa Fe, NM	W	1.68	41.4%	80.7%	-21.7%
Seattle-Tacoma, WA	W	5.10	33.1%	50.9%	-11.8%
Spokane, WA	W	2.43	15.4%	22.1%	-5.5%
Stockton, CA	W	6.82	44.2%	40.3%	2.8%
Tucson, AZ	W	2.80	39.2%	46.0%	-4.7%
Visalia-Tulare-Porterville, CA	W	7.39	35.2%	35.3%	-0.1%
Yakima, WA	W	4.31	20.1%	60.1%	-24.9%
Yuba City, CA	W	3.41	26.1%	51.2%	-16.6%
Yuma, AZ	W	5.00	77.5%	130.4%	-23.0%

** In rare instances when metropolitan areas extended into another Census region, the primary center city is used for the regional grouping*

*** Denotes extreme outliers. Urbanized land reflects sampling error; see Appendix A for details*

Appendix C: Explaining differences in density, density change, and urbanized land change

Dependent variable	
Percent change in MSA urbanized land area, using 1990 PMSA boundaries	Sources 1997 National Resources Inventory
Independent variables	
Demography and socioeconomic status	
Population change (percent), 1982-97	Sources 1982 Census estimates, 1997 estimates by authors based on 1990 and 2000 census
Percent change in number of persons per household (estimate), 1982-97	Authors' estimates based on 1980 and 1990 persons per household and 2000 census
Metropolitan area population, 1982 (base-10 logarithm)	1982 Census estimates
Per capita income, 1982	Bureau of Economic Analysis-REIS
Median income, 1989	1990 Census of Population and Housing, STF3
Income polarization (rich + poor / middle income households)	1990 Census of Population and Housing, STF3
Percent of households very low income 1989	1990 Census of Population and Housing, STF3
Percent of population under 18 years old 1990	1990 Census of Population and Housing, STF1
Percent of population 65 years and over 1990	1990 Census of Population and Housing, STF1
Percent of population foreign born 1990	1990 Census of Population and Housing, STF3
Race	Sources
Black-white segregation (D index), tracts, 1990	1990 Census of Population and Housing, STF1
Hispanic-white segregation (D index), tracts, 1990	1990 Census of Population and Housing, STF1
Percent black, 1990	1990 Census of Population and Housing, STF1
Percent Hispanic, 1990	1990 Census of Population and Housing, STF1
Political and planning variables	Sources
Number of persons per local general purpose government, 1997	Census of Governments
Number of persons per school district, 1997	Census of Governments
Comprehensive planning mandate	Authors' research
State review of comprehensive plans	Authors' research
Fiscal structure	Sources
Percent of local government revenues from property tax, 1982	Census of Governments
Percent of school district revenues from local sources, 1992	Census of Governments, F-33 collection
Infrastructure	Sources
Percent of local budgets spent on highways, 1982	Census of Governments
Percent of dwellings on sewers, 1990	1990 Census of Population and Housing, STF3
Percent of dwellings on public water, 1990	1990 Census of Population and Housing, STF3
Percent of land area in rural transportation uses, 1982	1997 National Resources Inventory
Economy	Sources
Percent of employment in manufacturing, 1982	US Census Bureau, County Business Patterns
Percent change in employment, 1982-92	US Census Bureau, County Business Patterns
Percent change in manufacturing employment minus percent change in total employment, 1982-92	US Census Bureau, County Business Patterns
Landscape/physical variables	Sources
Coastal or border MSA	Authors' research
Surrounded by other MSAs and coasts/borders	1997 National Resources Inventory
Percent land 15+% slope	1992 National Resources Inventory
Percent covered by wetlands, 1982	
Ownership variables	Sources
Percent land in private ownership 1982	1992 National Resources Inventory
Agriculture variables	Sources
Average farm size 1982	Census of Agriculture
Average value of farm products sold per acre 1982	Census of Agriculture
Percent of land prime farmland 1982	1997 National Resources Inventory
Average value of farm land and buildings per acre of farmland 1982	Census of Agriculture

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For More Information:

William Fulton, President
Solimar Research Group
phone: 805-643-7700
e-mail: **bfulton@solimar.org**

Rolf Pendall, Assistant Professor
Department of City & Regional Planning
Cornell University
and Senior Research Associate
Solimar Research Group
phone: 607-255-5561
e-mail: **rjp17@cornell.edu**

Brookings Center on Urban and Metropolitan Policy
phone: 202-797-6139
web: **www.brookings.edu/urban**

THE BROOKINGS INSTITUTION

1775 Massachusetts Avenue, NW • Washington D.C. 20036-2188
Tel: 202-797-6000 • Fax: 202-797-6004
www.brookings.edu

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National Association of REALTORS
Median Home Sale Prices

Metropolitan Area	1999	2000	2001	% of Lincoln
Buffalo/Niagara Falls, NY	81.4	79.8	84.1	71.64%
Beaumont/Port Arthur, TX	76.3	80.8	84.3	71.81%
Waterloo/Cedar Falls, IA	74.8	80.2	84.5	71.98%
Saginaw/Bay City/Midland, MI	81.9	80.2	84.7	72.15%
El Paso, TX	78.1	80.2	85.8	73.08%
Syracuse, NY	82.1	81.0	86.1	73.34%
Springfield, IL	86.1	85.0	87.3	74.36%
Shreveport, LA	83.2	83.8	88.0	74.96%
Peoria, IL	86.2	87.2	88.6	75.47%
Topeka, KS	80.2	80.6	88.7	75.55%
Davenport/Moline/Rock Island, IA/IL	82.8	86.3	90.0	76.66%
Amarillo, TX	81.4	86.3	90.2	76.83%
Corpus Christi, TX	85.0	87.9	91.6	78.02%
Rochester, NY	87.7	87.6	92.2	78.53%
Springfield, MO	85.8	86.0	92.3	78.62%
Daytona Beach, FL	84.5	85.3	92.7	78.96%
South Bend/Mishawaka, IN	86.7	82.2	92.8	79.05%
Ft. Wayne, IN	92.2	91.6	93.9	79.98%
Wichita, KS	91.5	90.8	94.9	80.83%
Oklahoma City, OK	84.2	85.4	95.0	80.92%
Little Rock-N. Little Rock, AR	91.2	87.8	95.1	81.01%
Pittsburgh, PA	89.9	93.6	97.8	83.30%
Melbourne/Titusville/Palm Bay, FL	90.3	96.9	98.4	83.82%
Fargo/Moorhead, ND/MN	93.4	97.1	99.5	84.75%
Champaign/Urbana/Rantoul, IL	90.6	98.8	100.3	85.43%
Rockford, IL	94.6	95.9	101.5	86.46%
San Antonio, TX	91.1	96.0	103.8	88.42%
Charleston, WV	N/A	99.4	104.7	89.18%
Appleton/Oshkosh/Neenah, WI	93.3	100.5	105.0	89.44%
Pensacola, FL	98.9	101.1	105.0	89.44%
Tulsa, OK	92.8	100.0	105.6	89.95%
Biloxi/Gulfport, MS	92.2	N/A	105.7	90.03%
Mobile, AL	93.3	97.6	106.9	91.06%
Chattanooga, TN/GA	99.1	101.1	107.3	91.40%
Dayton/Springfield, OH	104.1	105.1	107.3	91.40%
Canton, OH	105.0	N/A	107.8	91.82%
Spokane, WA	106.8	104.2	108.0	91.99%
Jacksonville, FL	95.2	100.0	109.9	93.61%
Toledo, OH	98.1	104.0	111.1	94.63%
Akron, OH	104.9	110.1	113.6	96.76%
Sioux Falls, SD	N/A	106.5	113.9	97.02%
Baton Rouge, LA	103.6	109.1	114.0	97.10%
Ft. Myers/Cape Coral, FL	94.4	97.6	115.7	98.56%
Gary/Hammond, IN	107.1	107.0	115.7	98.55%
Cedar Rapids, IA	105.8	112.9	115.7	98.55%
Columbia, SC	109.5	112.8	115.8	98.64%
Kalamazoo, MI	110.9	109.9	116.0	98.81%
Saint Louis, MO/IL	102.9	108.4	116.2	98.98%
Indianapolis, IN	110.9	112.3	116.9	99.57%
[redacted]				99.74%
Knoxville, TN	108.3	110.8	117.2	99.83%
[redacted]				
New Orleans, LA	109.1	112.0	117.4	100.00%
Gainesville, FL	108.0	113.1	118.0	100.51%
Lansing/East Lansing, MI	105.2	111.2	119.5	101.79%
Grand Rapids, MI	106.7	114.9	121.1	103.15%
Albany/Schenectady/Troy, NY	106.1	111.1	121.6	103.58%
Lexington/Fayette, KY	111.9	118.2	121.7	103.66%
Tampa/St. Petersburg/Clearwater, FL	94.0	110.8	122.3	104.17%
Houston, TX	105.3	116.1	122.4	104.26%
Green Bay, WI	107.6	118.1	123.9	105.54%
Orlando, FL	105.3	111.2	124.1	105.71%
Greenville/Spartanburg, SC	113.8	118.1	124.5	106.05%
Memphis, TN/AR/MS	111.3	115.6	125.1	106.56%
Des Moines, IA	110.5	116.4	125.3	106.73%
Atlantic City, NJ	117.0	121.5	125.7	107.07%
Springfield, MA	114.6	120.4	127.4	108.52%
Tucson, AZ	117.7	120.5	128.8	109.71%
[redacted]				110.39%

Tallahassee, FL	117.8	122.5	129.7	110.48%
Boise City, ID	123.9	126.0	130.0	110.73%
Nashville, TN	116.4	N/A	130.0	110.73%
Cincinnati, OH/KY/IN	119.9	126.7	130.2	110.90%
Dallas, TX	115.7	122.5	131.1	111.67%
Greensboro/Winston-Salem/High Point, NC	124.8	129.3	132.7	113.03%
Richmond/Petersburg, VA	128.5	129.8	133.3	113.54%
Albuquerque, NM	130.3	130.4	133.3	113.54%
Birmingham, AL	127.1	125.5	133.6	113.80%
Eugene/Springfield, OR	129.5	132.8	134.6	114.65%
Philadelphia, PA/NJ	124.8	125.2	134.8	114.82%
Kansas City, MO/KS	120.7	127.4	135.7	115.59%
Columbus, OH	125.0	129.1	135.7	115.59%
Wilmington, DE/NJ/MD	120.6	127.6	136.5	116.27%
[redacted]				116.78%
Bradenton, FL	117.2	127.3	137.8	117.38%
Atlanta, GA	123.7	131.2	139.1	118.48%
Phoenix, AZ	126.4	134.4	139.4	118.74%
Sarasota, FL	134.8	132.0	140.1	119.34%
Charlotte/Gastonia/Rock Hill, NC/SC	138.2	140.3	144.9	123.42%
[redacted]	[illegible]			124.87%
[redacted]	[illegible]			125.64%
Salt Lake City/Ogden, UT	137.9	141.5	147.6	125.72%
Las Vegas, NV	130.8	137.4	149.1	127.00%
Milwaukee, WI	135.3	140.7	149.4	127.26%
W. Palm Beach/Boca Raton/Delray Beach, FL	131.0	138.4	149.5	127.34%
Charleston, SC	131.7	137.9	150.8	128.45%
Austin/San Marcos, TX	128.6	142.8	152.0	129.47%
Worcester, MA	117.0	131.8	152.6	129.98%
Portland, ME	N/A	140.6	157.1	133.82%
Riverside/San Bernardino, CA	128.7	138.6	157.2	133.90%
Providence, RI	128.8	137.8	158.0	134.58%
Baltimore, MD	127.4	153.0	158.2	134.75%
Tacoma, WA	N/A	151.1	159.5	135.86%
Madison, WI	136.5	153.6	162.5	138.42%
Miami/Hialeah, FL	134.6	144.6	162.7	138.59%
Reno, NV	150.6	157.3	165.2	140.72%
Trenton, NJ	144.2	150.9	165.3	140.80%
Minneapolis/St. Paul, MN/WI	138.7	151.4	167.1	142.33%
Hartford, CT	150.7	159.9	167.3	142.50%
New Haven/Meriden, CT	145.7	151.6	168.0	143.10%
Ft. Lauderdale/Hollywood/Pompano Beach, FL	136.1	148.7	168.1	143.19%
Raleigh/Durham, NC	165.0	158.4	168.2	143.27%
Portland, OR	165.0	170.1	172.3	146.76%
Sacramento, CA	131.5	145.2	174.2	148.38%
Aurora/Elgin, IL	151.9	163.0	178.2	151.79%
Lake County, IL	164.0	169.4	178.9	152.39%
[redacted]				165.93%
Chicago, IL	171.2	171.8	198.5	169.08%
Monmouth/Ocean, NJ	164.4	179.0	208.6	177.68%
Washington, DC/MD/VA	176.5	182.6	212.7	181.18%
Denver, CO	171.3	196.8	218.3	185.95%
Los Angeles Area, CA	199.0	215.9	241.4	205.62%
Seattle, WA	N/A	230.1	245.4	209.03%
Middlesex/Somerset/Hunterdon, NJ	196.8	219.7	246.4	209.88%
Nassau/Suffolk, NY	190.4	214.0	248.4	211.58%
New York/N. New Jersey/Long Island,NY/NJ/CT	203.2	230.2	258.7	220.36%
Newark, NJ	212.0	242.4	263.1	224.11%
Bergen/Passaic, NJ	221.8	261.2	288.8	246.00%
San Diego, CA	231.6	269.4	298.6	254.34%
Honolulu, HI	290.0	295.0	299.9	255.45%
Orange Cnty. (Anaheim/Santa Ana MSA), CA	280.9	316.2	355.6	302.90%
Boston, MA	290.0	314.2	356.6	303.75%
San Francisco Bay Area, CA	340.8	454.6	475.9	405.37%

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PRESERVATION ASSOCIATION OF LINCOLN

Amendments offered to the draft of the
Lincoln-Lancaster Comprehensive Plan for 2002

- **F142 Strengthen historic preservation ordinances and Historic Preservation Commission powers to prevent the demolition of historic buildings.**
- **F142 Widen the scope of powers of the Historic Preservation Commission to include all of Lancaster County.**
- **F142 Preserve historic public buildings for continued public use.**

CRITERIA FOR COMMERCE CENTERS:

Commerce centers should generally contain a mix of land uses, including residential uses.

Streets and public spaces should be designed within each center to enhance pedestrian activity.

Commerce centers should have convenient access to the major roadway system and be supported by roads with adequate capacity.

Physical linkages (trails and sidewalks) should be utilized to directly connect commerce centers with adjacent development.

Commercial locations should be easily assessable by all modes of transportation including pedestrian, bicycle, transit and automobile.

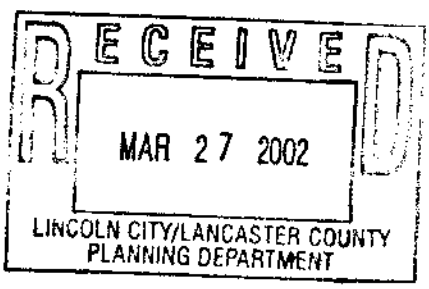
CRITERIA FOR COMMUNITY CENTERS:

Community centers may vary in size from 300,000 to nearly a million square feet of commercial space.

Community centers can have a community wide appeal but primarily serve a geographic sub area within Lincoln and surrounding areas within the County.

The general location of future community centers should be indicated in advance in the Comprehensive Plan.

One of the proposed locations is South 40th Street and Rokeby Road.



CRITERIA FOR NEIGHBORHOOD CENTERS:

Neighborhood centers typically range in size from 150,000 to 250,000 square feet of commercial space.

Neighborhood centers provide services and retail goods oriented to the neighborhood level, such as Lenox Village at 70th and Pioneers Boulevard.

Neighborhood centers should generally not develop at corners of intersections at two arterial streets. There may be circumstances due to typography or other factors where centers at the intersection may be the only alternative.

The center shall be located in a neighborhood with greater residential density than is typical for a suburban area and the center itself contains higher density residential uses (density above 15 dwelling units per acre) provide a significant mix of uses, including office, service, retail, residential and open space. Multi-story buildings are encouraged.

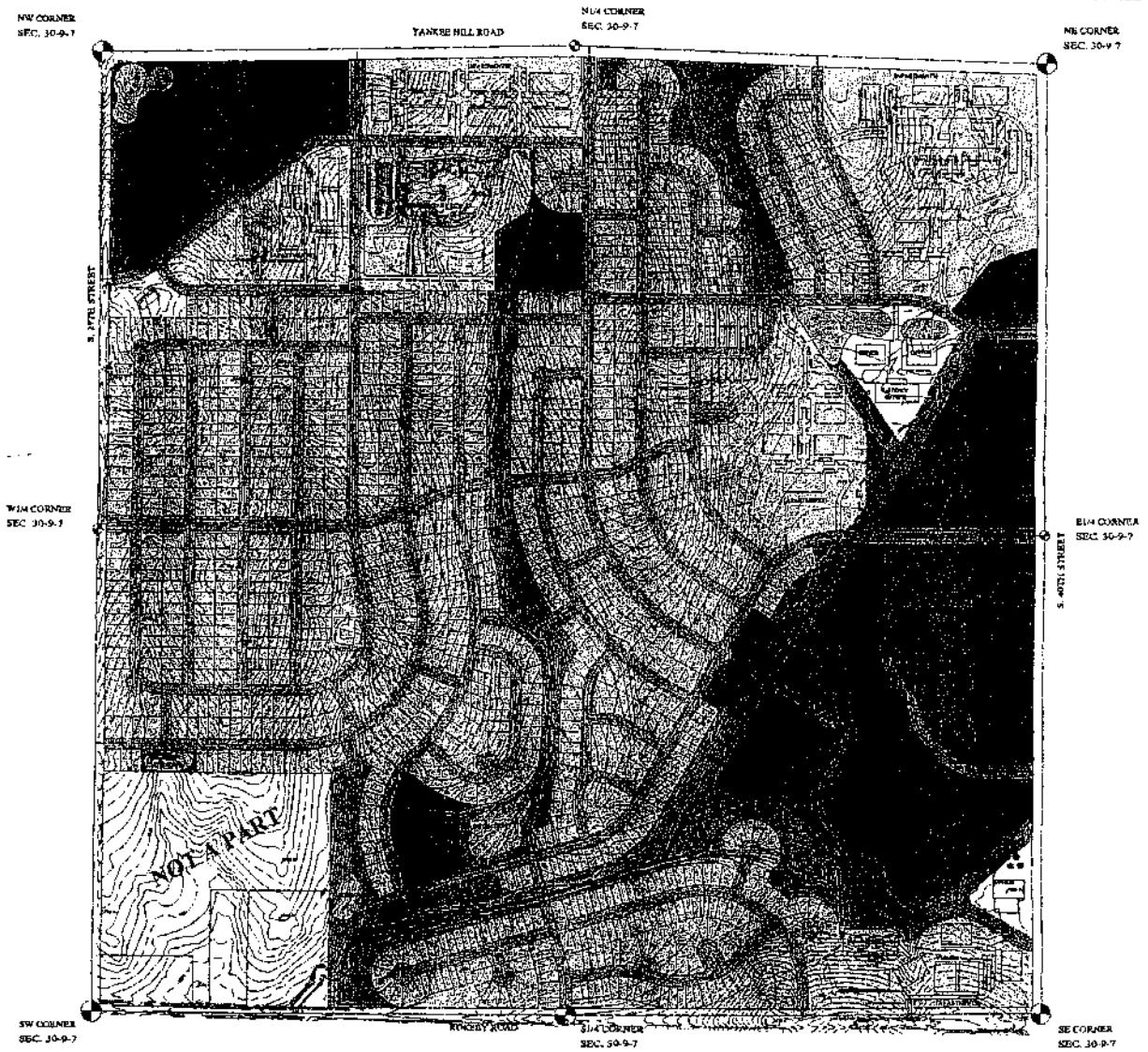
Provide for greater pedestrian orientation in their layout.

MASTER PLAN FOR
27TH STREET & YANKEE HILL ROAD

SYMBOL	AREA SUMMARY				
	LAND AREA	ACRES	DENSITY	DWELLING UNITS	BUILDING S.F.
	Single Family/ 2-Family	297	4-6 Units/Acre	1,188 - 1,782 Units	-
	Multi-Family	83.0	30-50 Units/Acre	2,490 - 4,150 Units	-
	Office	14.0	15,000 sq ft/Acre	-	210,000
	Commerce Center				
	Community Center	77.0	13,000 sq ft/Acre	-	1,000,000
	Neighborhood Center	25.0	8,000 sq ft/Acre	-	200,000
	School	16.0	-	-	-
	Park	11.5	-	-	-
	Open Space	61	-	-	-
	TOTAL	565± ACRE	-	3,678 - 5,932 Units	1,410,000
	TRAIL	-	-	-	-

N

NO SCALE



EDC
ENGINEERING DESIGN CONSULTANTS

27TH STREET & YANKEE HILL ROAD

LINCOLN, NEBRASKA

Drawn By: LEF
Dwg.: COLORUP
Date: 3/20/02

SHEET

Nebraska Sustainable Agriculture Society
Newsletter

"Building healthy land, people, communities and quality of life, for present and future generations."

November 2001 Number 79

In This Issue

The NSAS Newsletter is a bimonthly publication of the Nebraska Sustainable Agriculture Society, a private, nonprofit organization. The mission of NSAS is "to promote agriculture & food systems that build healthy land, people, communities & quality of life, for present and future generations". The purpose of this newsletter is to inform its readers about sustainable agriculture issues, resources, and activities. Members receive this newsletter as a benefit. Inquiries pertaining to the content of this newsletter should be addressed to the editor, Paul Rohrbaugh, 402-

Buying Local is the Key to a Sustainable Agriculture and a Secure Food Supply

By Paul Rohrbaugh

Over the years this newsletter has published numerous articles on sustainable agriculture, reasons to buy local food, and how to change our world by what we eat. By definition, sustainable agriculture must be **ecologically sound, economically viable, and socially responsible.** Sustainable agriculture is clearly "economically viable" if there is a commitment and loyalty to buying locally. That is not only true in agriculture but with any business or service. We have all seen the decline of local businesses as we buy more from the large national chains. I recently was exposed to an interesting way of looking at the impact of buying locally. If every Nebraskan consumed enough Nebraska grown food to return only $1.00 per meal to the farmer, that would provide a gross income of $100,000 to nearly 20,000 farmers. Of the 54,000 farms in Nebraska, it would not be surprising to see 20,000 farmers responding to this market opportunity. The key words in this statement are *Nebraska grown, Nebraska consumed* and *return to the farmer*. Let's look at this statistic on a smaller scale. If every person in Lancaster County consumed enough food grown in their own county to return $1.00 per meal to a farmer, it would take all of the Lancaster County farmers growing $100,000 worth of food plus an additional 1250 farmers from surrounding counties to provide the food. These figures may not apply to everyone and the gross income of $100,000 would result in different nets but do you begin to see the power of purchasing locally?

Among the reasons given for buying locally are: the quality of food, the preservation of genetic diversity, preserving the family farmer, preserving rural communities, and supporting a clean environment.

But how does this happen? By purchasing locally, we have the opportunity to interact directly with the producer. We can share with him the kinds of food we want, the kind of environment that we want, how much we will pay for these added values, etc. By allowing the farmer to make an adequate living from the food we eat, we can increase the likelihood that the farmer and his family will be there to carry on our values in the future.

Any food that is grown and processed outside of our small area of influence must be taken by faith. It is difficult to verify any production claims (regardless of how lofty they may sound), or to influence grower practices. As we move into an era of greater globalism, which apparently includes terrorism, the safety and security of our food supply is of greater concern than ever before. When you buy locally, you have the opportunity to verify and influence the quality and production practices of your food.

In conclusion, for a sustainable agriculture and food supply to exist, it must be economically viable. Economic viability for most producers requires that their products be purchased locally. Since a sustainable agriculture and food system is essential to our daily lives, it behooves each of us to buy as much as we can locally, thereby sustaining the farms and farmers that can provide for these needs. The Nebraska Sustainable Agriculture Society is working hard to promote sustainable agriculture and food systems and the local access to these products.

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MOTION TO AMEND

I hereby move to amend the 2025 Lincoln City-Lancaster County Comprehensive Plan text for **Airports and Airfields,** the third paragraph on Page F122 to read as follows:

***

The Lincoln Airport Authority will assess the existing and future noise impacts, noise contours for the Airport environment in a *Part 150 Airport Noise Compatible Planning Study*. The Airport Authority should begin the *Part 150 Study* within one year from the adoption of this Comprehensive Plan, and the material results should be processed as amendments to the Comprehensive Plan and City and County land use ordinances. These results could effect the development patterns in southwest and northwest Lincoln and other parts of the County.

Introduced by:

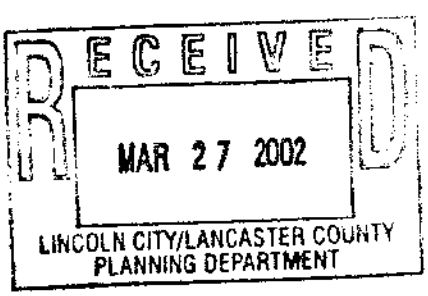
_____

Approved as to Form & Legality:

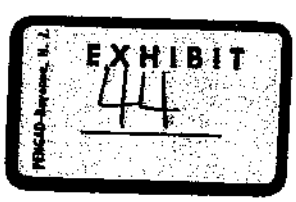
_____
City Attorney

Staff Review Completed:

_____
Administrative Assistant



Requested by: Seacrest & Kalkowski, P.C. on behalf of B & J Partnership, Ltd.



MOTION TO AMEND

I hereby move to amend the 2025 Lincoln City-Lancaster County Comprehensive Plan to read as follows:

Amendment One: Add More Developable Land; Amend Map of Tier 1 - Priority Areas, Page F32:

Amend the Map of Tier 1 Priority Areas:

- Show two priorities instead of three: Priority 1 and Priority 2 would be enlarged and the Priority 3 designation removed.
- Priority 1 would designate land for near term development, contiguous to existing development and would provide basic infrastructure within 10 to 12 years. Priority 2 would be carried out during the balance of the Tier 1 time frame.
- Based upon an expanded 10 to 12 year time period, Priority 1 should be expanded to include more land opportunities:

    1) Expand the Stevens Creek Priority 1 area to include the Priority 2 area (down to "O" Street); and
    2) Expand the South Priority 1 area to include the area ½ mile south of Rokeby Road generally between S. 20th and S. 48th Streets.

Amendment Two: Modify Priority Text; Amend Text of **Principles for Priority Areas,** Page F33:

Amend the text of **Priority Area Plan For Tier 1**, starting on Page F 31:

Setting Priorities

The top priority for infrastructure improvements is the existing city and areas that are currently under development. In order to provide for the orderly future growth of the city, additional land is identified in Tier I as the next area for improvement. However, the community does not have the financial resources, nor is it necessary, to provide urban services to all of the Tier I area within the next few years. So within Tier I, the community needs to prioritize areas for infrastructure improvements. ~~The Tier I Priority Areas principles divide Tier I into three priorities.~~

Top Priority Area

Area generally within the city limits at the beginning of the planning period. There are still significant infrastructure needs within the existing city and areas currently under development. Some larger projects, such as Antelope Valley, will be ongoing throughout the planning period and will require significant infrastructure resources.

Priority 1 of Tier I

Areas designated for near term development and are generally contiguous to existing development and should be provided with basic infrastructure within 10 to 12 years of the adoption of the plan. Some of the infrastructure required for development may already be in place. This area includes some land already annexed, but is still undeveloped and without significant infrastructure. Areas with this designation are the next priority for infrastructure programming. Some infrastructure improvements may be done in the near term while others, such as road improvements that are generally more costly, may take longer to complete. ~~If a development proposal is within the Priority 1 area that is not scheduled for improvements until later in the CIP, then the developer is responsible for completing the improvements that are not yet programmed in the CIP.~~

Priority 2 of Tier I

The next area for ~~mid term~~ development beyond Priority 1. ~~Once water and sewer improvements are completed in the first priority area, then these improvements may begin in the Priority Area 2 area, even if other infrastructure items are not yet completed in the Priority 1 areas.~~

~~**Priority 3 of Tier I**~~

~~Areas designated for development after Priority 1 and 2.~~ Currently lack almost all of the infrastructure required to support development. In areas with this designation, the community will maintain present uses until urban development can commence. Infrastructure improvements to serve this area will not initially be included in the City's CIP, but will be considered in the long term capital improvement planning of the various city and county developments.

The principles for prioritization and the individual priority areas are described as follows:

Principles for Priority Areas:

- The top priority for the City's Capital Improvement Program (CIP) is to maintain existing infrastructure, provide for new neighborhood improvements and to complete needed improvements for areas already under development.

- Infrastructure improvements should be made concurrent with development.

- ~~As a means of implementing the Plan Vision for multi-directional development, improvements should be provided in as many different areas of the community, at the same time, as possible.~~In order to implement the Plan Vision, infrastructure should generally be provided in different directional growth areas, depending upon limited financial resources and if there is development interest in the area.

- Funds for i~~I~~mprovements in new major drainage basins to the southwest ~~(Haines Branch)~~ and to the east ~~(Stevens Creek) should begin at the same time to allow development to occur simultaneously in these basins~~should provide the opportunity for development to begin in theses areas within the next 10 to 12 years based upon the following:

  1) There are five southwest drainage basins where future urban development could follow sound planning principals and develop first in the lower basin reaches that are contiguous to Lincoln's future service limits and proceed upstream in an orderly fashion. Within one year from the adoption of this Comprehensive Plan, the City, with public involvement and input, should carry out a further detailed planning process for the southwest basins to further analyze and select which southwest basin(s) are best suited for the start of urban development based upon infrastructure, market demand, and developer/landowner interests. The southwest planning process would create competition between property owners and developers which will help reduce overall development costs. The outcome of the planning process would be the identification of which basin(s) should be developed during the Priority 1 and Priority 2 time periods and incorporation of the priorities into the Comprehensive Plan. While the southwest basins are being reviewed, the City should begin designating infrastructure dollars in a place holder designation in the CIP for the southwest Priority 1 area.

  2) While the southwest area has multiple basin opportunities, the east opportunities are located in a single major basin--Stevens Creek. Sound planning, infrastructure and financing considerations compel opening up Stevens Creek in a north (downstream) to south (upstream) pattern. The City should begin designating infrastructure dollars in a place holder designation in the CIP for the Stevens Creek Priority 1 area.

- The community should only approve development proposals that can be adequately served by all public facilities.

- Generally, adequate infrastructure improvements should be completed in all Priority 1 areas where there is development interest prior to beginning infrastructure in Priority 2 areas.~~Within a specific directional growth area, when the **infrastructure** is complete within a Priority 1 area, improvements should not commence in the Priority 2 area, until the infrastructure is completed in the remaining Priority 1 areas. For example, water and sewer improvements in the southern growth area should not proceed to the Priority 2 area, until water and sewer improvements have been place din all Priority 1 areas throughout the city.~~

- It is anticipated that there may be some unique circumstances to warrant consideration of development of land in Priority 2, prior to the full completion of improvements in Priority 1. The community will consider **development in a sub-basin~~proposals~~** in Priority 2 areas, before completing ~~all~~ the infrastructure in Priority 1 areas, ~~if and only~~ if all of the following conditions are met:

  1) the project is contiguous to the City and proposed for immediate annexation, and is consistent with principles of the Comprehensive Plan.

  2) ~~the developer provides immediately, at his or her own cost without public reimbursement, all of the necessary infrastructure improvements to serve the proposed development and any other areas that would be served by accepting development in Priority Area 2 area (Infrastructure shall include all utilities, roads, fire stations, public safety, parks, trails, schools and library needs.)~~the developer provides information demonstrating how the necessary infrastructure improvements to serve the sub-basin would be provided and financed. The City shall contact other public agencies to obtain their report on the infrastructure necessary to serve the sub-basin including utilities, roads, fire service, public safety, parks, trail, schools and library needs.

  3) ~~there is neither impact to nor changes needed in the Capital Improvement Program~~the impact that development in the sub-basin will have on capital and operating budgets, level of service, service delivery and Capital Improvement Programs is addressed,

  4) there is demonstrated ~~an extraordinary~~ substantial public benefit and circumstances that warrant approval of the proposal ~~out of priority order~~in advance of the anticipated schedule.

- Explore options to permit the City Council to annually adopt a six year Capital Improvement Program to serve as a planning and programming guide.

Amendment Three: Residential - Overall Guiding Principles, Page F67:

Amend the **Overall Guiding Principles** for Residential to add the following paragraphs:

A safe residential dwelling should be available for each citizen: the efficiency apartment and the country estate, the small single family "starter" home and the large downtown apartment suite, the most affordable and the most expensive dwelling unit, completely independent living and living within the care of others. Provision of the broadest range of housing options throughout the community improves the quality of life in the whole community.

Yet this diversity of housing choices directly depends upon achieving affordable housing.

Housing affordability is not merely important for the community, it is imperative. Lack of affordable housing directly impacts citizens' assets and opportunities, which in turn shape the community's assets and opportunities. Failure to achieve housing affordability reduces the quality of life for income groups disproportionately, creates widespread hardships and stress, and retards the City's collective abilities to address community problems and objectives.

Amendment Four: Amend Map for **Existing and Proposed Industrial Center**, Page F39:

Amend the Existing and Proposed Industrial Center Map as follows:

Within one year from the adoption of this Comprehensive Plan, the City, with public involvement and input, should incorporate into the Plan a Heavy Industrial (HI) area in South Lincoln in order to minimize work/live travel distance and take advantage of existing and plan transportation networks.

Amendment Five: Amend Text for **Neighborhood Centers (N)**, Page F48:

Amend the first paragraph of Neighborhood Centers (N), Criteria to read as follows:

Neighborhood Centers are not sited in advance on land use plan. Within one year of the adoption of the Plan, most of the Neighborhood Centers should be sited on the land use plan in order to provide notice to residential dwellers before they move into the neighborhood. Siting Neighborhood Centers in advance will also help optimize traffic networks, pedestrian utilization and land use patterns. ~~However, i~~In neighborhoods oriented to greater pedestrian activity and residential density, two neighborhood centers may be located within a square mile of urban residential use.

Amendment Six: Amend Text for **Medical Health Care**, Page F130:

Amend the Medical Health Care to read as follows:

Currently, Bryan LGH West and St. Elizabeth's Hospitals are undergoing significant expansions. The Bryan LGH East campus and Madonna Rehabilitation hospitals also recently underwent major renovations and construction as well. These four campuses, located near existing residential neighborhoods, are expected to remain the vital core to health care services in the county and region. It is important to Lancaster County citizens and other surrounding areas to develop Lincoln as a major network of quality regional health care services at reasonable costs.

Hospitals represent one of the highest and most important community service land uses. Further construction on these campuses in the future is likely. Any hospital expansion will need to take into consideration the impact on the adjacent neighborhoods. Hospitals are planning on using parking garages and multi-story construction in order to maximize the use of the land.

Amendment Seven: Remove Text Incorporating Yet To Be Completed or Adopted Studies, Tasks Forces, Maps and Plans:

Amend the Plan to remove any reference of incorporating into the Plan any Study, Task Force, Map or Plan not yet completed or duly adopted. It is not good due procedural process to incorporate yet to be identified results, policies or standards into the Plan without proper staff review, public analysis, public hearings, Planning Commission recommendations and City Council or County Board approval.

Amendment Eight: Remove the word "shall" and replace with "will" or "should".

The Comprehensive Plan is the community's planning guide. The present draft uses the word "shall" in many places which suggest that the Plan is an ordinance and has the force of law. The Plan's guiding principals will lead to adoption of land use tools and decisions (zoning, subdivision, building codes and design standards) which do have the force of law. Amend the Comprehensive Plan to remove the word "shall" and replace with words like "will" or "should".

Amendment Nine: Incorporate More Public Utilities, Community Facilities, and Transportation **Maps**

Incorporate more maps into the Plan showing existing and proposed locations for Utilities, Transportation, Information Technology, Community Facilities, Parks, Recreation and Open Space, Historic and Cultural Resources, and Education Maps. These maps have historically been incorporated into prior Comprehensive Plans and are valuable in providing notice and important information to residential dwellers of planned activities and land uses, as well as facilitating better private sector planning and investment of private capital.

Amendment Ten: Enlarge the **Maps** so they are easier to read

Many of the Plans map are too small or lack color making them very hard to read and comprehend. Enlarge the Maps and provide more colored Maps so they are easier to read.

Amendment Eleven: Amend Text for **Plan Amendments**, Page F160:

Amend the Plan Amendments to read as follows:

The Plan is the community's collective vision. Yet, change is inevitable. Major technologies and new community needs will arise during the planning period which were not foreseen during the Plan's development. Jobs, housing, transportation, goods and services will shift over time. The amendment process to the Plan must accommodate and help manage the inevitable change in a way that best promotes, and does not compromise, the community's core values, health and well being. The Plan amendment process must be an open and fair process, utilizing sound planning, economic, social and ecological principals.

Amendments to the Plan may be submitted in writing to the Planning Director by any group or individual at any time during the year. The Planning Director shall have the discretion to determine the relevance of the request to the adopted Comprehensive Plan and to the comprehensive plan process. The Planning Director may elect to forward the Plan amendment request to the Planning Commission under the circumstances and timing determined most appropriate by the Director. Otherwise, amendments to the Plan by any group or individual will be compiled and reviewed by the Planning Commission once each year as part of the Planning Director's Annual Status Report.

Introduced by:

_____

Approved as to Form & Legality:

_____

City Attorney

Staff Review Completed:

_____

Administrative Assistant

Requested by: Seacrest & Kalkowski P.C. on behalf of Tom Schleich, John Schleich, Gerald Schleich, Tom White and John Brager, Southview Inc., and Ridge Development Company.

TO: Planning Commissioners
FROM Eleanor Francke
DATE March 27, 2002

I submit these recommendations focusing on the Review Draft of the Comp Plan for your consideration::

A. PROPOSED REDUCTION IN RURAL RESIDENTIAL DWELLING UNITS IN NORTH AREA OF COUNTY (F 73)

1. Delete references to the "eight dwelling units per square mile" for the north area of the County unless data clearly support that this sizable unit of land (approximately 150 square miles) is uniformly *in*appropriate for acreage development. Testimony from the area residents, for example, indicated that the stated land characteristics (F 73) are not accurate.

2. Continue to use the current County criteria e.g., safe and abundant water, 'sewerability', roads) to determine appropriateness of an application for a selected parcel of land for rural residential/acreage use.

B. RURAL LAND USE STUDY (F 77)

1. Given the lack of consensus and the limitations on time for decisions about rural land use matters during the recent Comp Plan Committee work, the recommended rural land use study needs to be supported. Such a study should help deal with relationships among such unresolved important land use issues as right to farm, declining farm population trends, and pressures for acreage development and urbanization.

2. The Review Draft recommends increased incentive bonuses for environmental and historic preservation. As the Comp Plan Committee did not submit ideas on this topic, it should be included in the rural land use study.

3. The issues related to regulations such as undefined 'stream protection corridors' and 'smoke buffers' need additional study. These two issues should be added to the rural land use study to help provide a comprehensive approach to rural land use.

4. The Comprehensive Planning Committee did not study the Stevens Creek Report with the intent of determining which of the recommendations should be incorporated into the Review Draft. In order to show respect for the ideas in the Report and for the citizens who participated in this effort, a review of the Stevens Creek Report should be included in the rural land use study. Doing this would also facilitate a broader forum for residents with rural interests

5. The proposed land use study is also expected to include a study of a "build-through" strategy. The adoption of a "build-through" approach (similar to that submitted to the Comp Plan Committee and at the March 13 hearing) should help facilitate a more compatible transition from rural acreages to urbanization. A "build-through" approach would be particularly applicable to those areas which are expected to be urbanized in the very near future. The implementation of a "build-through" approach would also have the potential to decrease the concern of those who worry about rural acreage interference(s) that might occur as future urbanization takes place.

C. COMPLETION OF RURAL LAND USE STUDY (F 77)

1. The Review Draft recommends that the study be completed in one year. This time line may be too ambitious to allow adequate study of the issues by County residents. I recommend that the language be modified by inserting the word "approximately " in front of the words "one year" in the second paragraph on page F 77.

2. Given the number of complex, unresolved rural issues identified in the Review Draft and additionally from citizen testimony at the hearings, it seems unreasonable to expect the Planning Commission to resolve all of these issues within the March - April-May timelines This Comp Plan, due to its 25-year length and anticipated population growth, provides a very important transition for the community and should not be short-changed.

3. I recommend, therefor, that the Planning Commission formally submit an amendment that the current rural land use policies continue to be implemented until the rural land use study is completed.

NEMAHA NRD

nemaha
NATURAL RESOURCES DISTRICT

125 Jackson • Tecumseh, Nebraska 68450
Telephone: (402) 335-3325 • Fax: (402) 335-3265
email: nnrd@nemahanrd.org

March 19th, 2002

Moser Well Drilling
Attn: Alan Moser
111 East 7th Street
Hickman, NE 68372

Dear Mr. Moser:

Enclosed is the information you requested concerning groundwater levels. Data for the last decade has been compiled for four locations with continuous data recorders within and just outside the Nemaha NRD. Additional observation well groundwater data is currently not readily available as the computer and geographical information system databases are under construction.

The information enclosed definitely contradicts the statements you mentioned that the Lancaster County Planning and Zoning had made. I searched their website for the information you mentioned but was unable to find anything stating a "50 foot to 90 foot groundwater decline". I also left a message for them to call me but I have not heard from them.

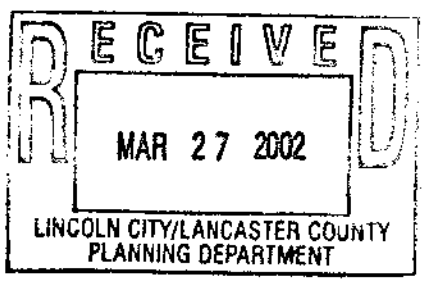
I will try to get you more of our observation well data as the computer system develops. If possible, please send me a copy of the Lancaster County Planning and Zoning GIS document.

If you should have any other questions please contact me.

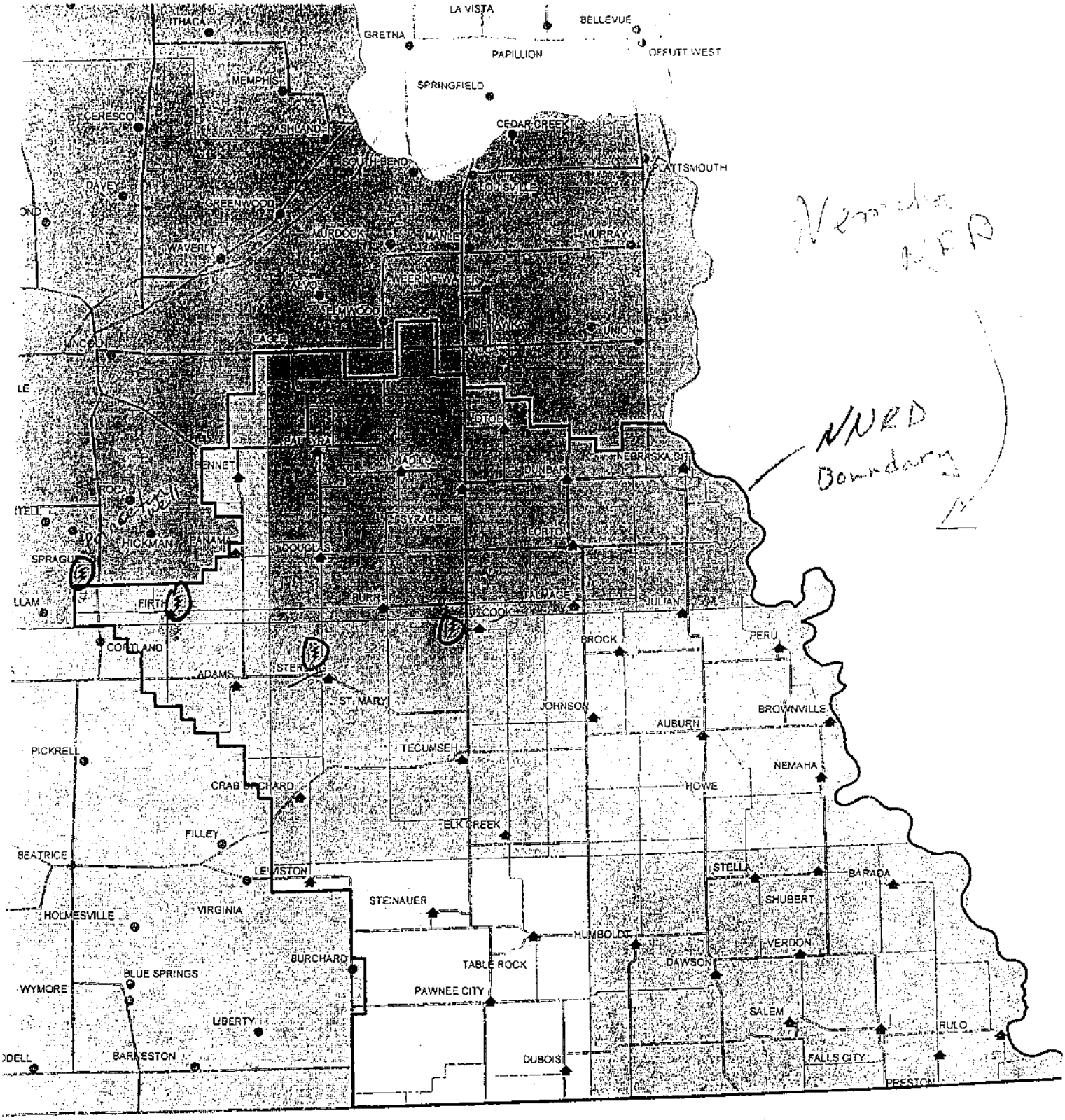
Sincerely,

Chuck Wingert

Chuck Wingert
Water Resources Manager



Enclosures



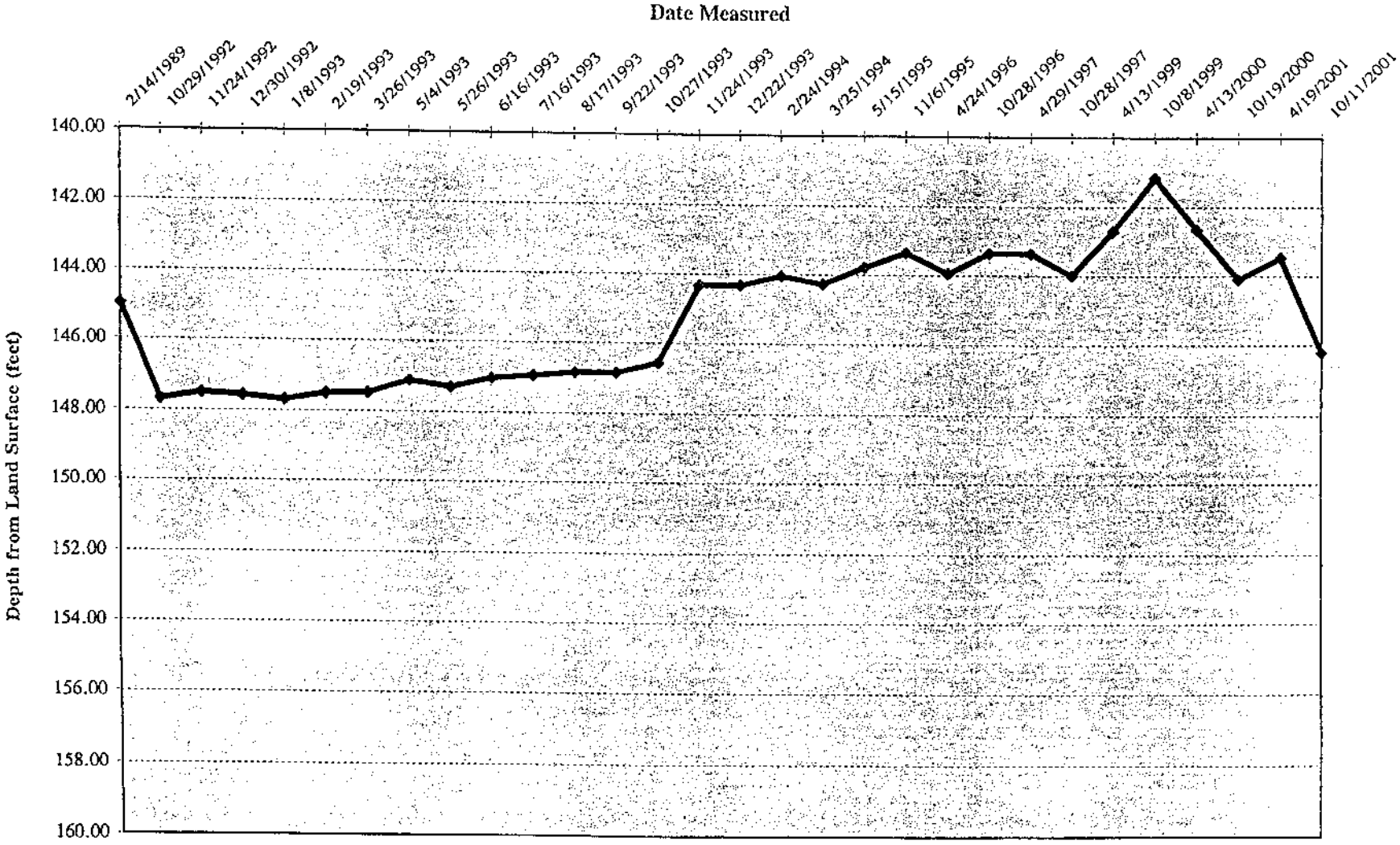
Observation Well Locations

Nemaha NRD

Township / Range / Section / Sub Section

7N 6E 15 DCC

PRINCETON USGS RECORDER WELL



LOWER PLATTE SOUTH
NATURAL RESOURCES DISTRICT

3125 Portia St., Box 83581, Lincoln NE 68501-3581
(402) 476-2729 · FAX (402) 476-6454
www.lpsnrd.org

March 21, 2002

Allen Moser
Moser Well Drilling
111 East 7th Street
Hickman, NE 68372

Dear Allen:

Enclosed is the information you requested from our office last week regarding water level changes in Lancaster County. I have included several hydrographs from various wells located throughout the county that shows the water level changes from spring to fall since the early 1980's. That is as far back as our data goes. Also attached is a map indicating the approximate location of the wells.

I hope this information is helpful and answers your questions.

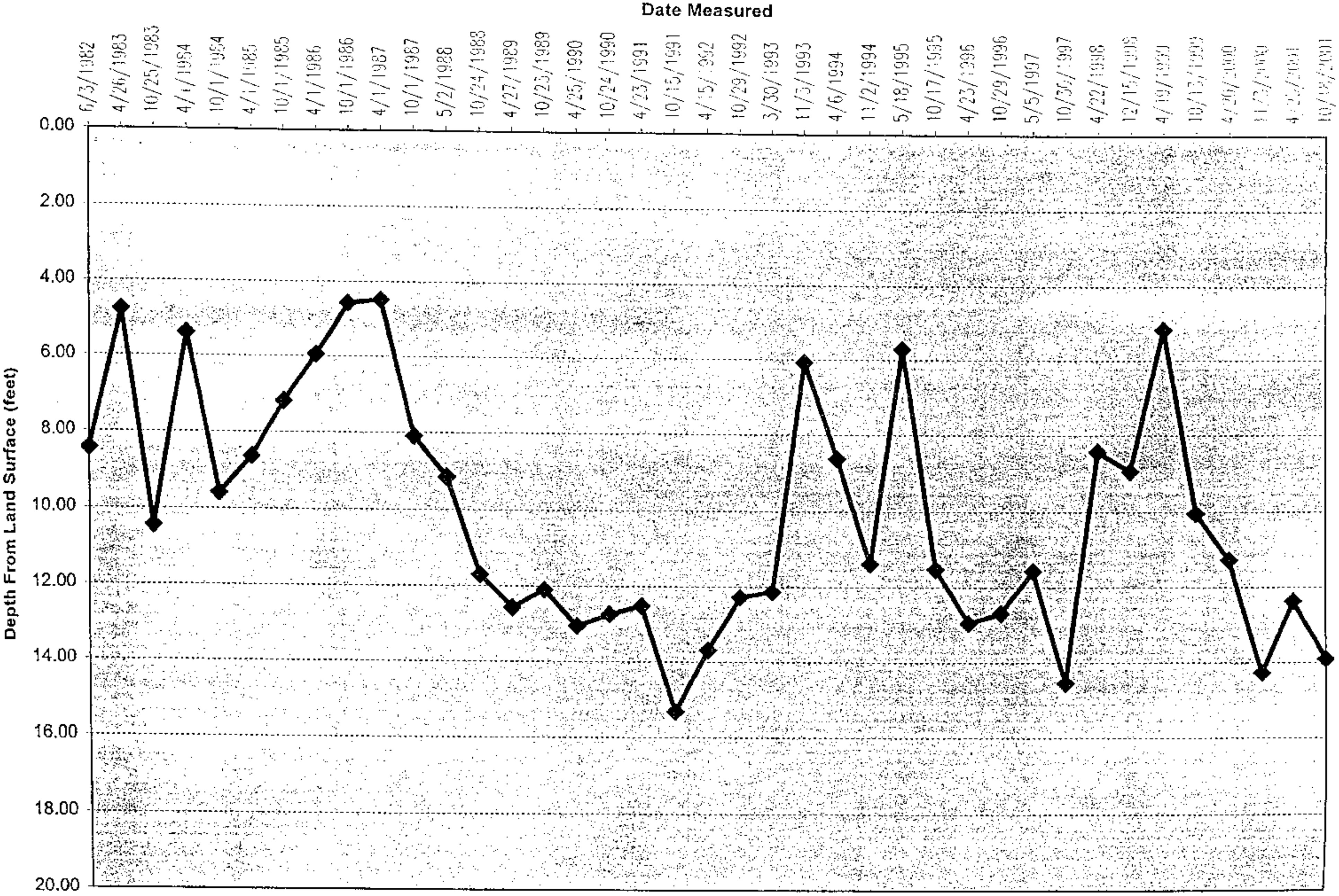
Sincerely,

Gregg Brettmann

Gregg Brettmann
Water Resources Specialist

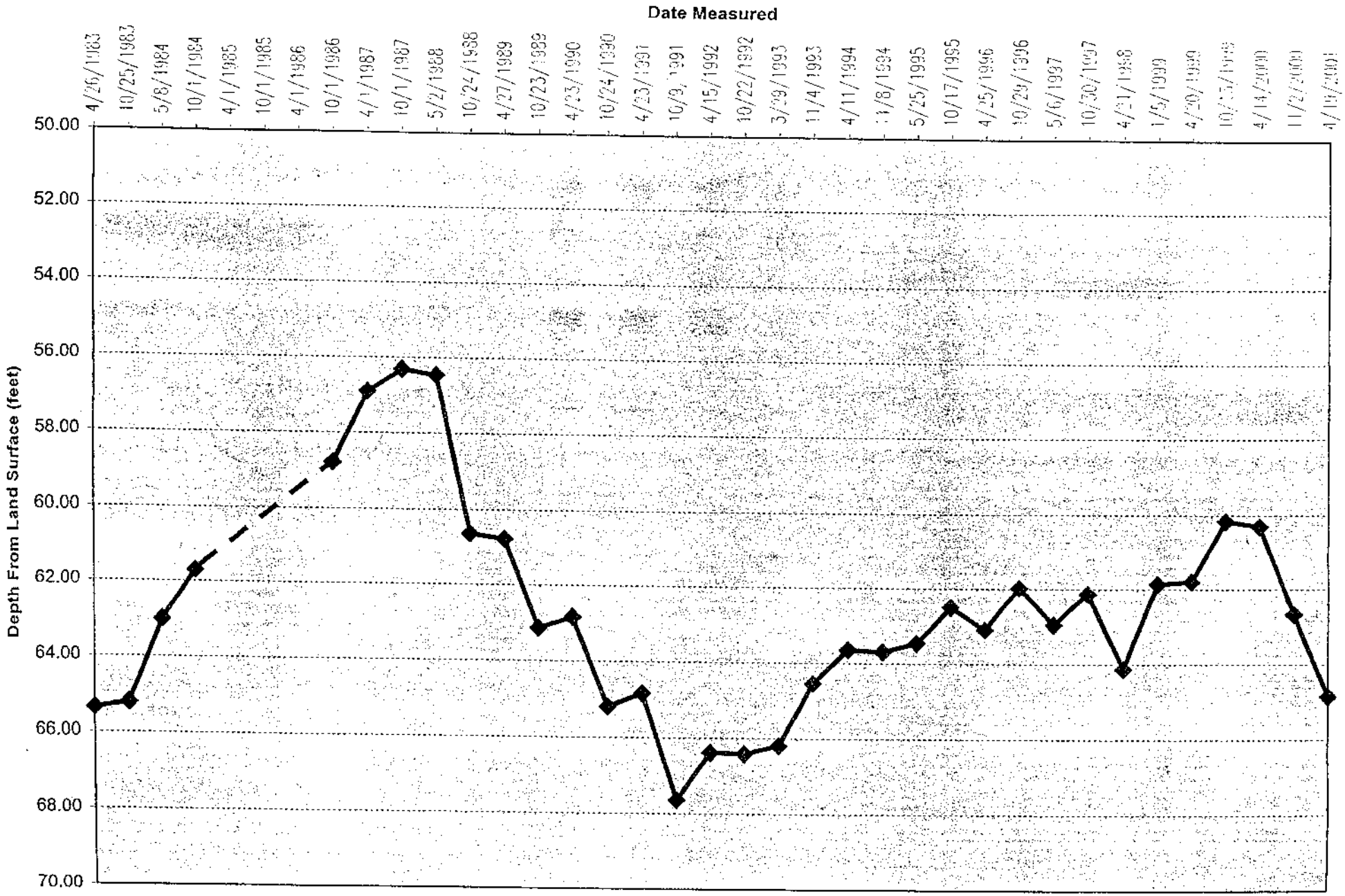
Pc: Groundwater File

11N 7E 25 D

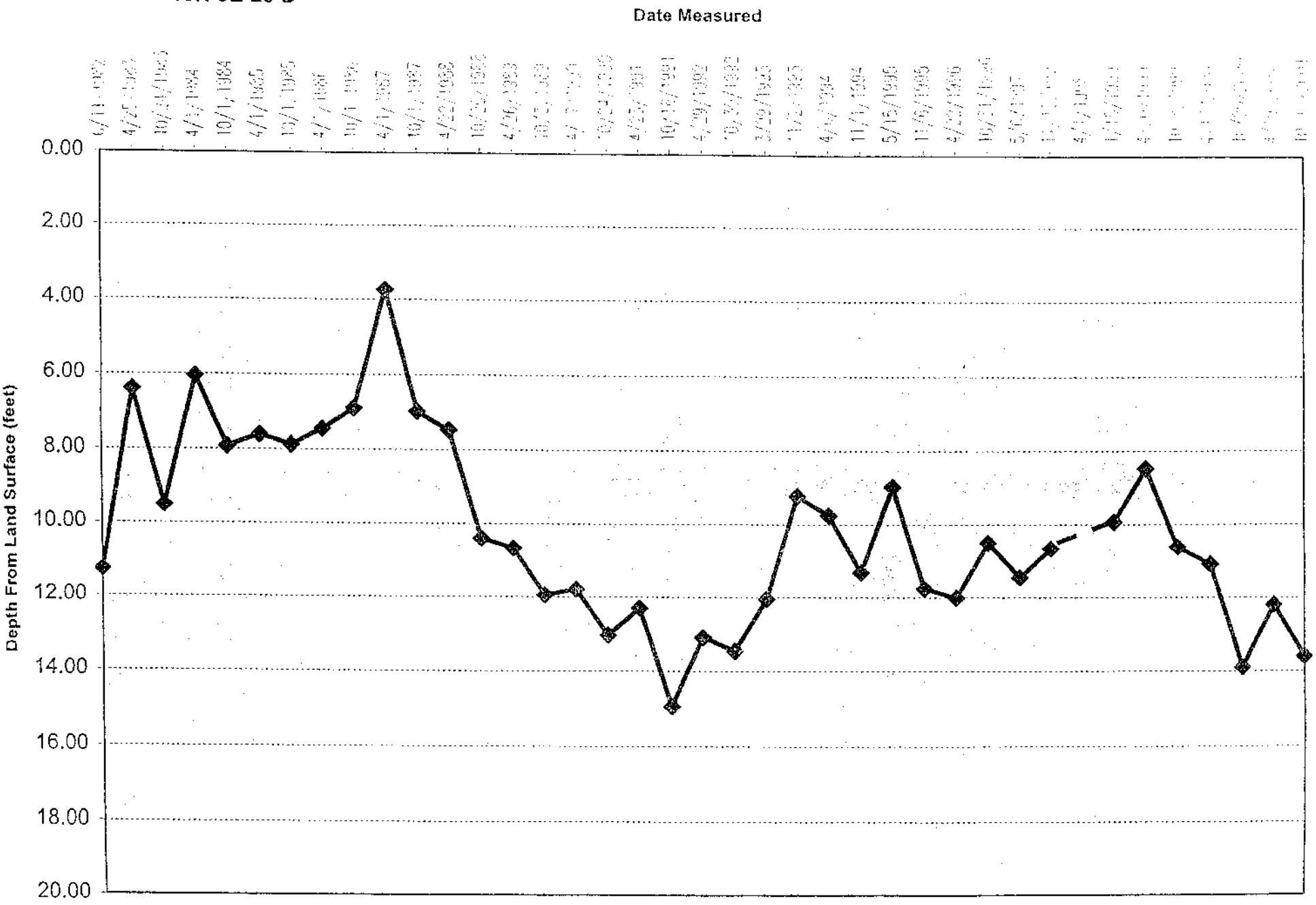


Date Measured
Depth From Land Surface (feet)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00
6/3/1982
4/26/1983
10/25/1983
10/1/1985
4/1/1986
10/1/1986
4/1/1987
10/1/1987
5/2/1988
10/24/1988
4/27/1989
10/23/1989
4/25/1990
10/24/1990
4/23/1991
10/15/1991
10/29/1992
3/30/1993
11/3/1993
4/6/1994
11/2/1994
5/18/1995
4/23/1996
10/29/1996
5/5/1997

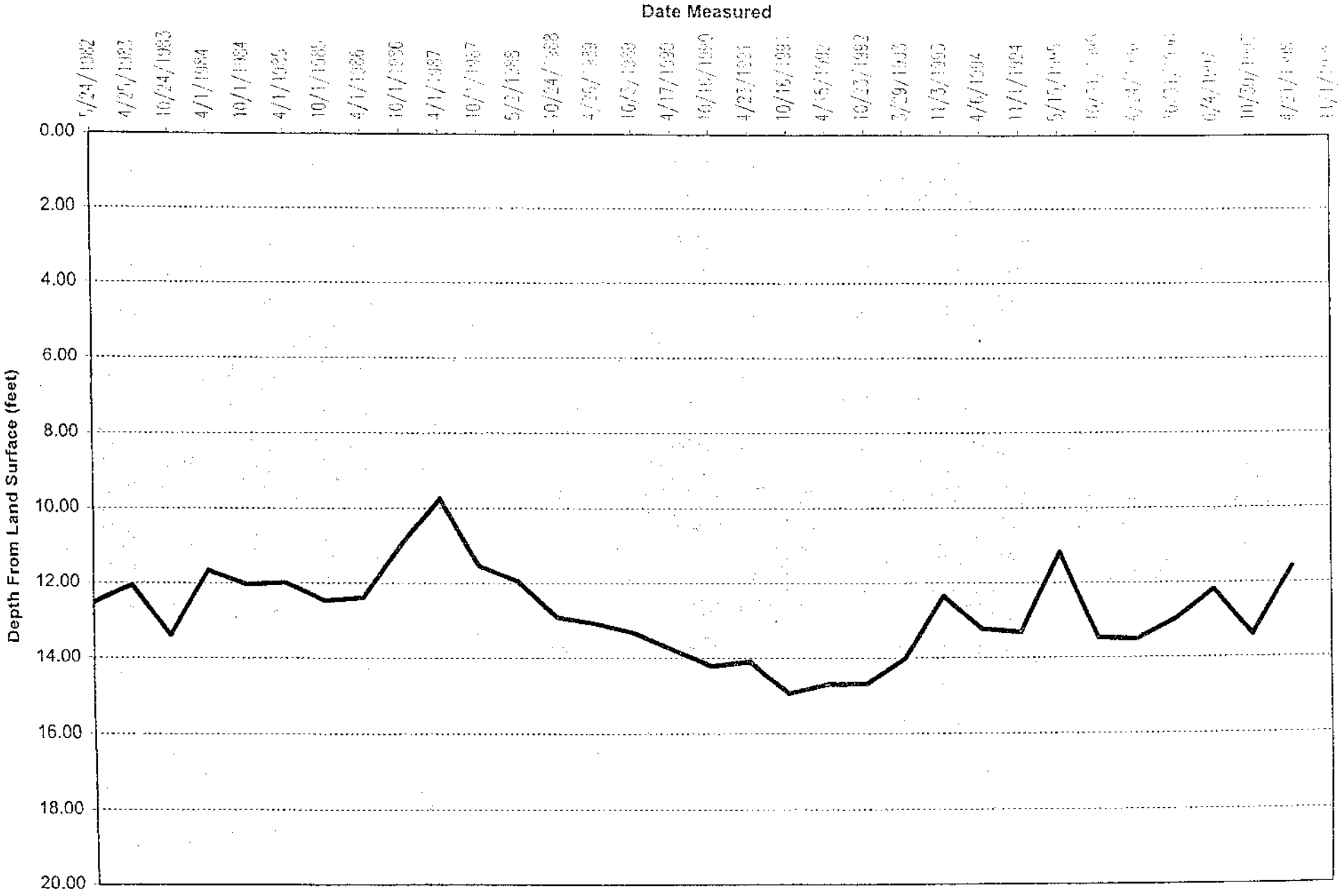
12N 7E 17 C Jack Nagel well



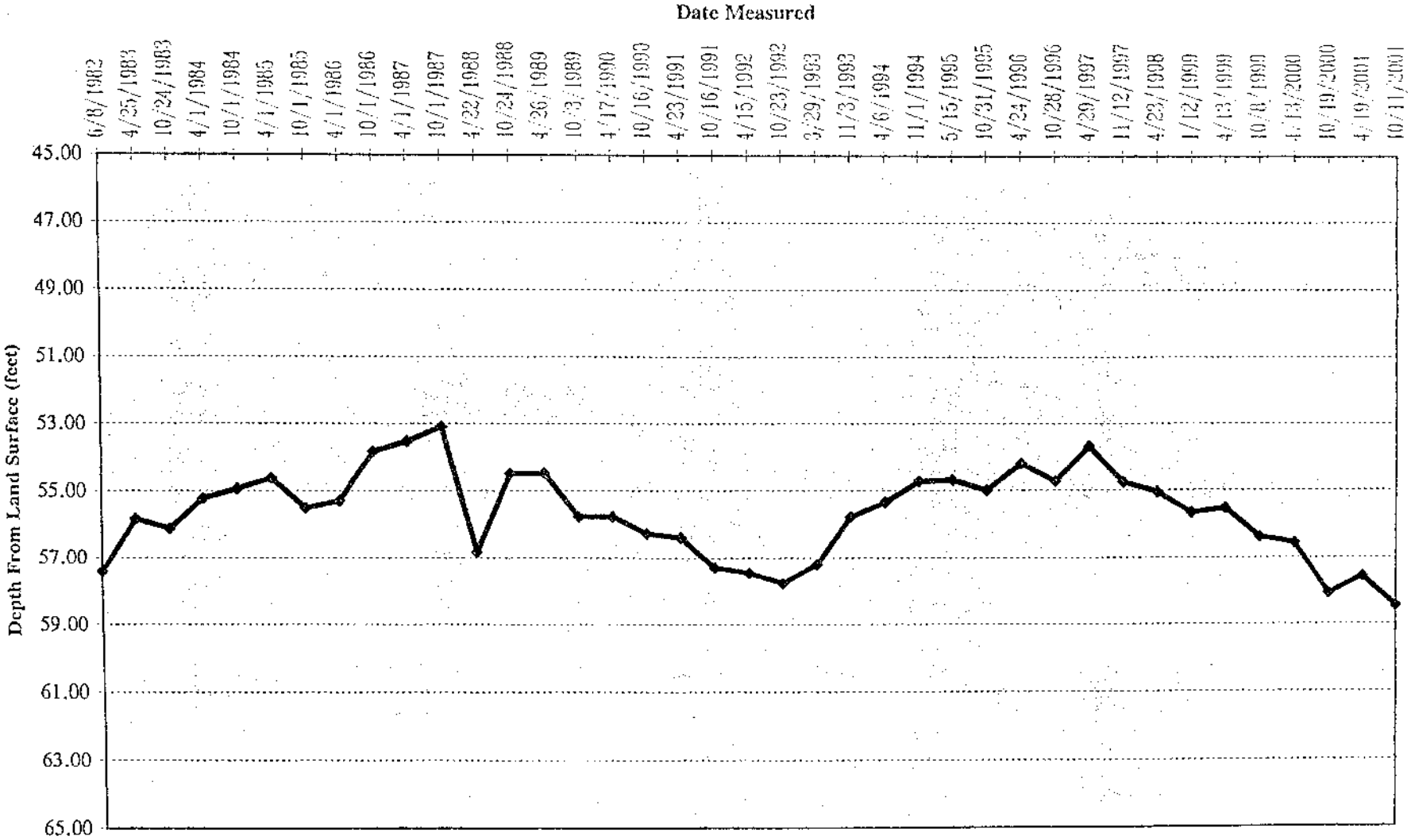
10N 5E 29 D

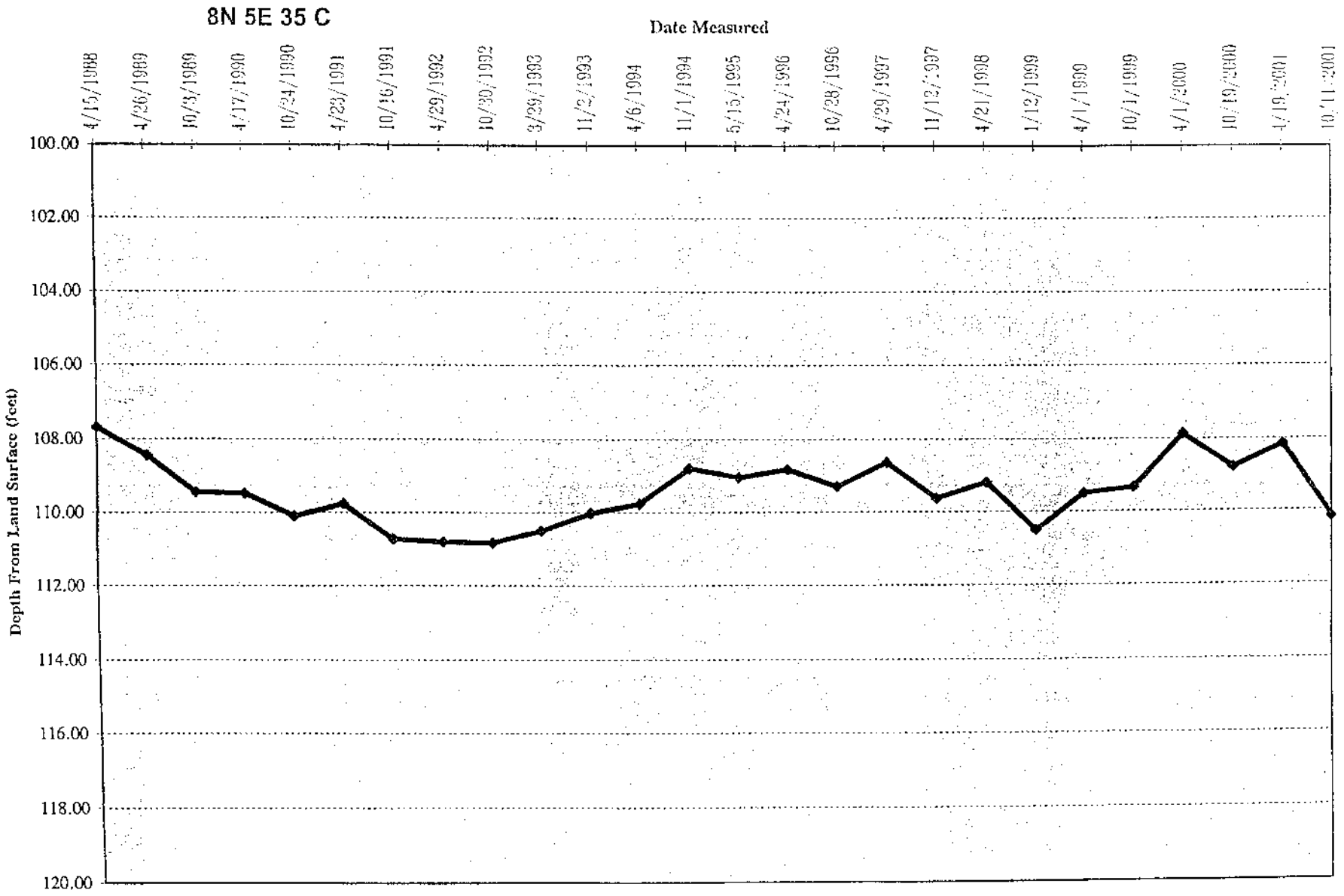

Date Measured
Depth From Land Surface (feet)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00

9N 6E 23 AAD

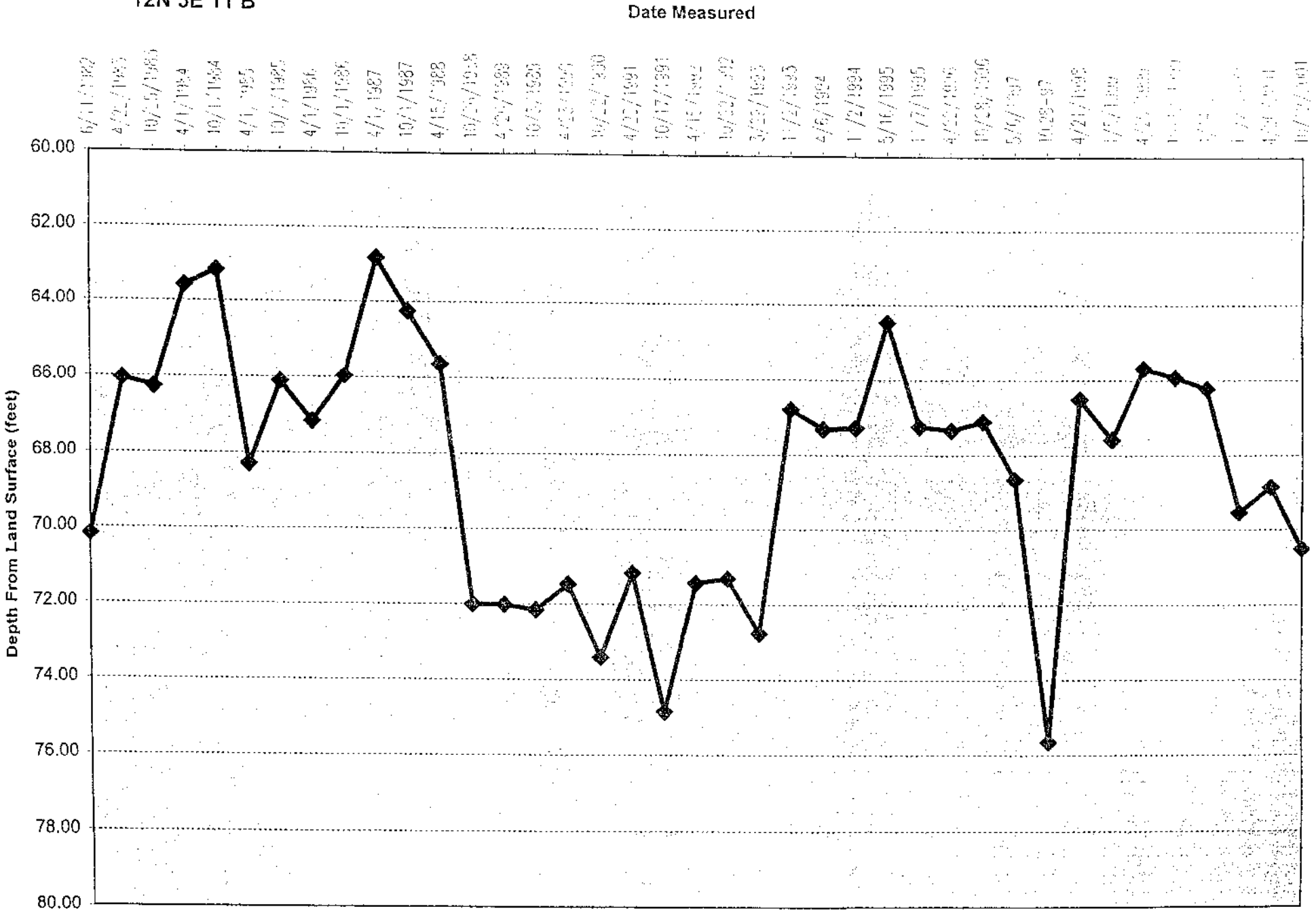

Date Measured
Depth From Land Surface (feet)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
18.00
20.00

7N 7E 12 B

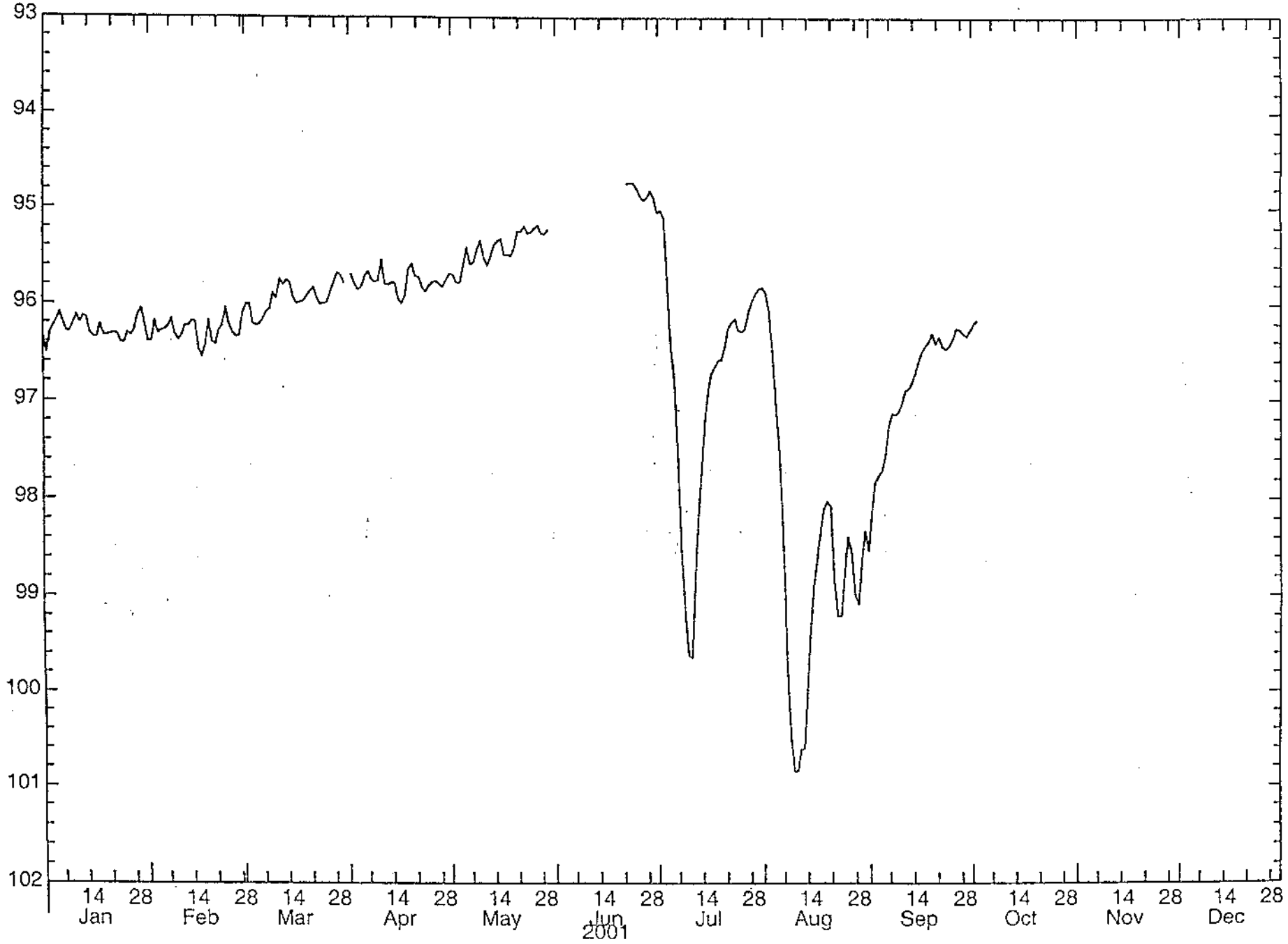

Date Measured
6/8/1982
4/25/1983
10/24/1983
4/1/1984
10/1/1984
4/1/1985
10/1/1985
4/1/1986
10/1/1986
4/1/1987
10/1/1987
4/22/1988
10/24/1988
4/26/1989
10/3/1989
4/17/1990
10/16/1990
4/23/1991
10/16/1991
4/15/1992
10/23/1992
3/29/1993
11/3/1993
4/6/1994
11/1/1994
5/15/1995
10/31/1995
4/24/1996
10/28/1996
4/29/1997
11/12/1997
4/23/1998
1/12/1999
4/13/1999
10/8/1999
4/11/2000
10/19/2000
4/19/2001
10/11/2001
Depth From Land Surface (feet)
45.00
47.00
49.00
51.00
53.00
55.00
57.00
59.00
61.00
63.00
65.00


8N 5E 35 C
Date Measured
4/15/1988
4/26/1989
10/3/1989
4/17/1990
10/24/1990
4/23/1991
10/16/1991
4/29/1992
10/30/1992
3/29/1993
11/2/1993
4/6/1994
11/1/1994
5/15/1995
4/24/1996
10/28/1996
4/29/1997
11/12/1997
4/21/1998
1/12/1999
4/1/1999
10/1/1999
4/1/2000
10/19/2000
4/19/2001
10/11/2001
Depth From Land Surface (feet)
100.00
102.00
104.00
106.00
108.00
110.00
112.00
114.00
116.00
118.00
120.00

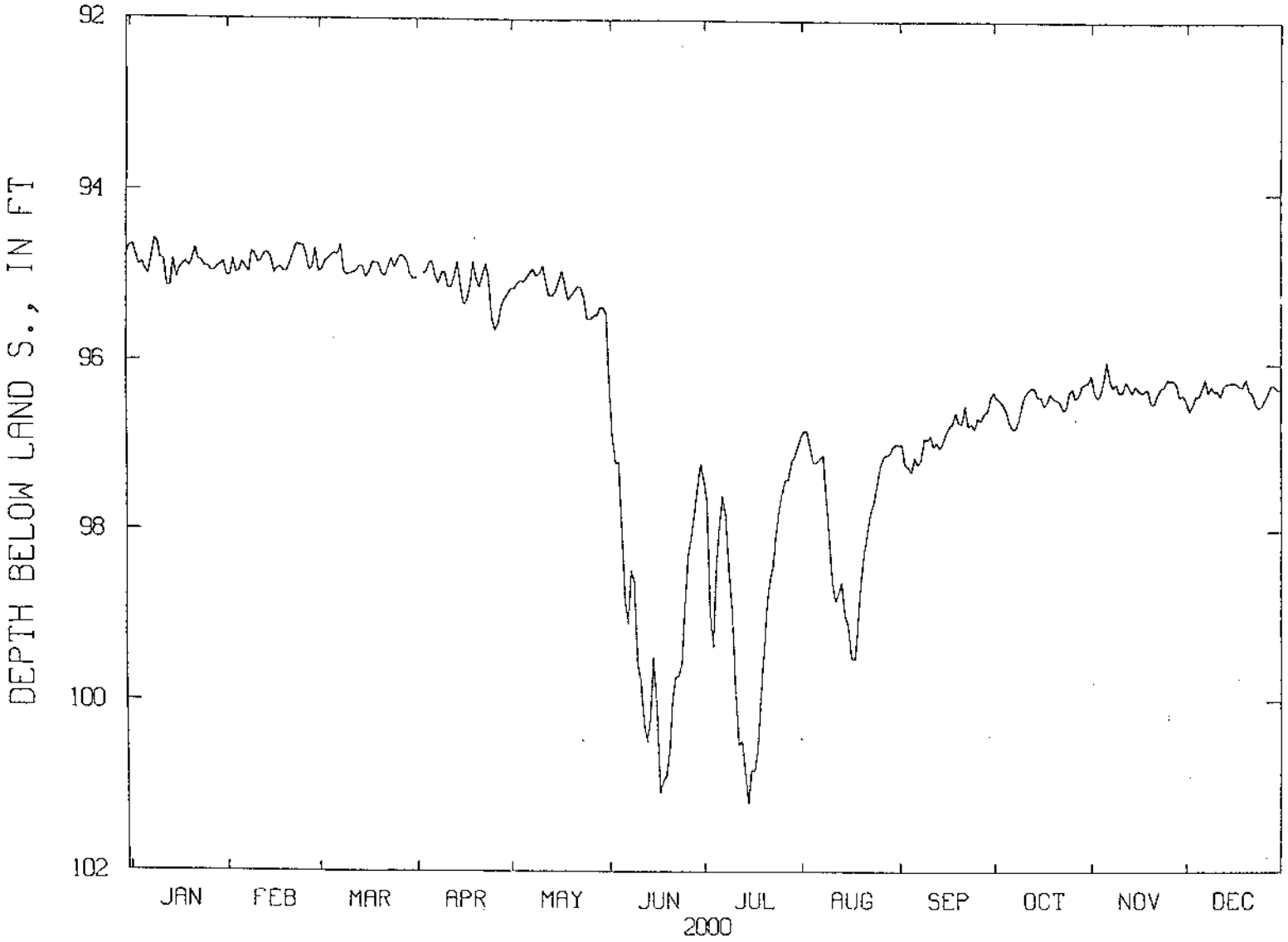
12N 5E 11 B


Date Measured
Depth From Land Surface (feet)
60.00
62.00
64.00
66.00
68.00
70.00
72.00
74.00
76.00
78.00
80.00

Firth Recorder Well



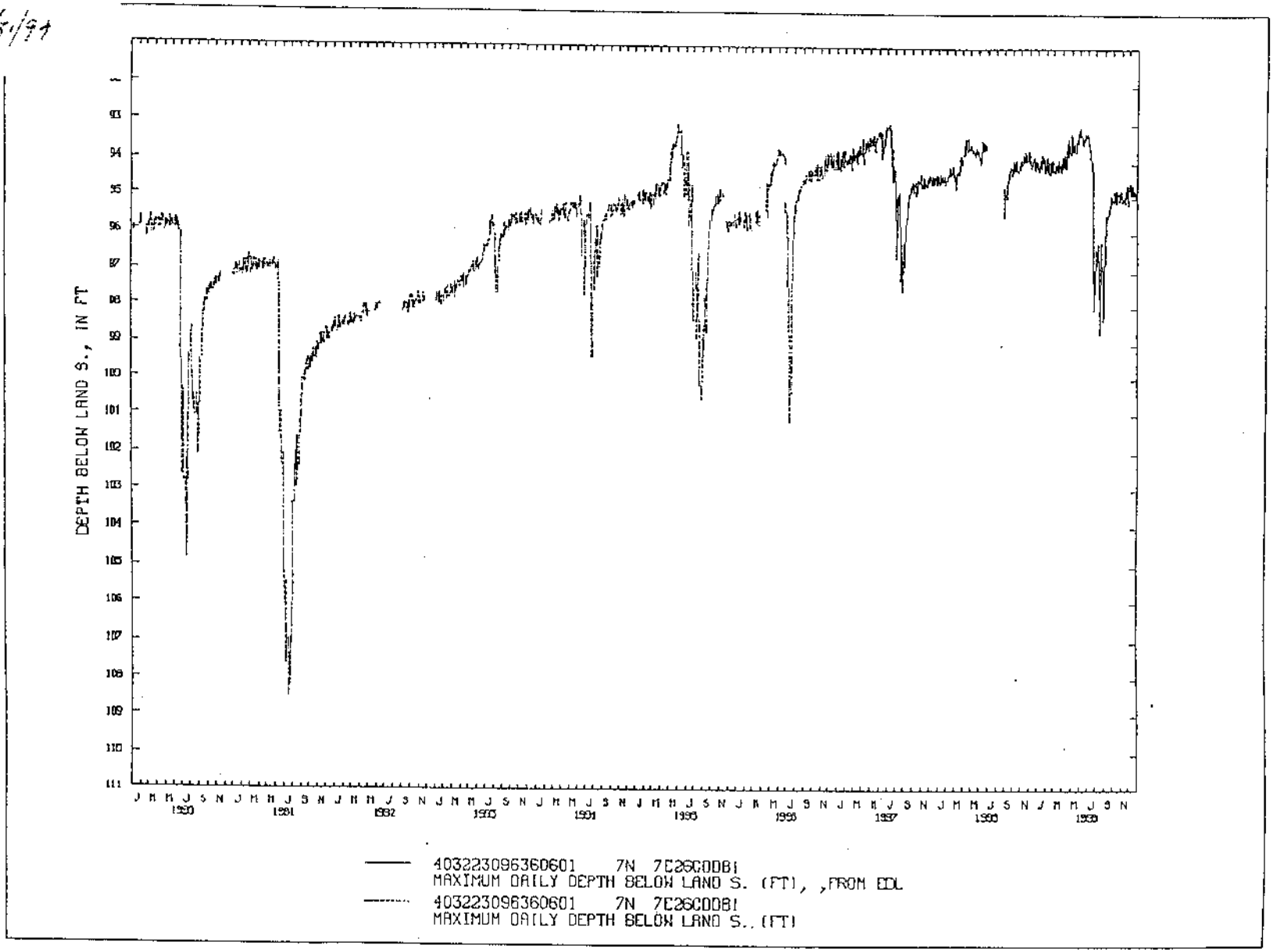
—— FIRTH 403223096360601 7N 7E26CDDB1 (DAILY DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET)) Edi



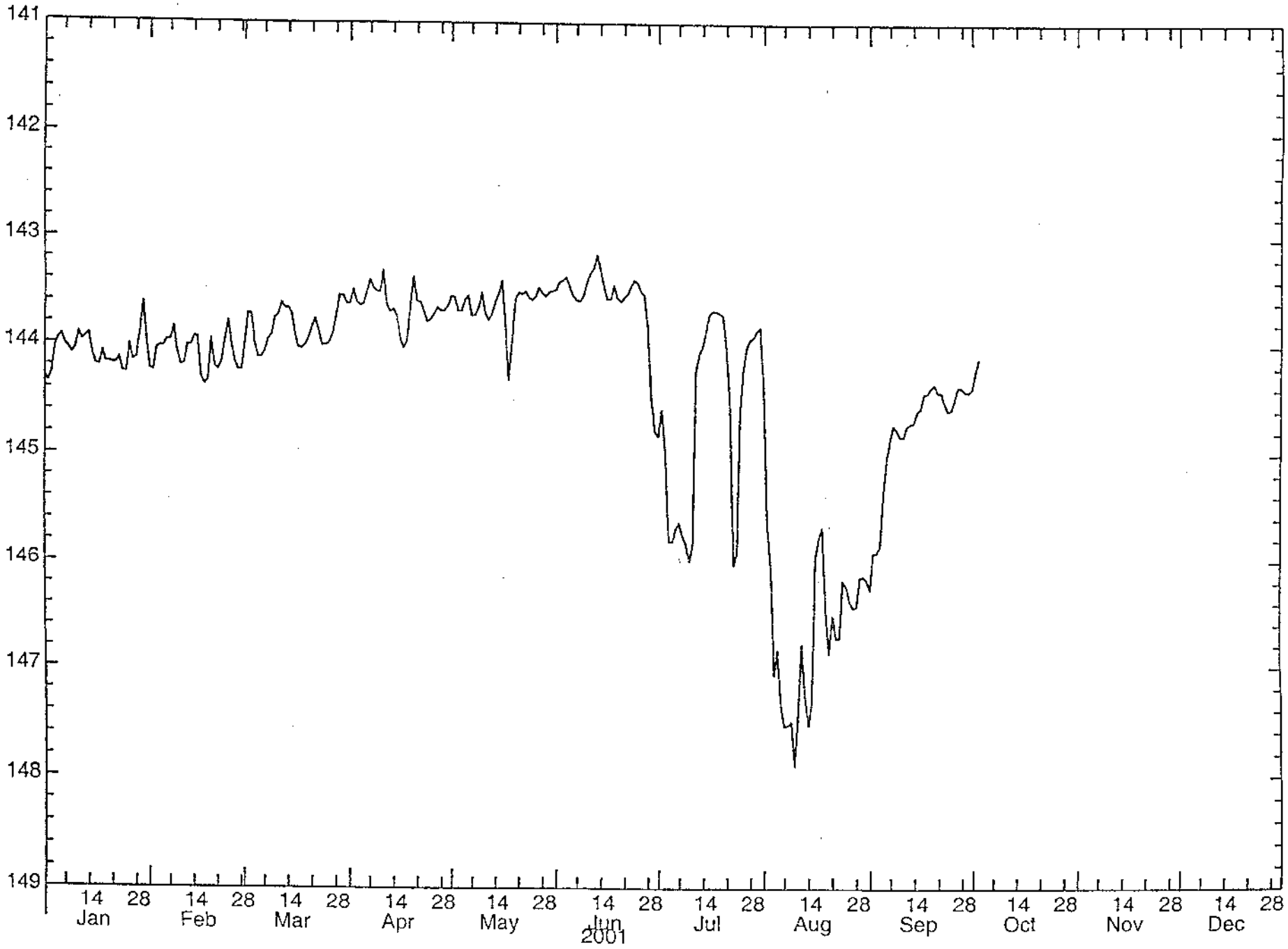
FIRTH WELL 403223096360601 7N 7E26CDDB1
MAXIMUM DAILY DEPTH BELOW LAND S. (FT), ,FROM EDL

Firth

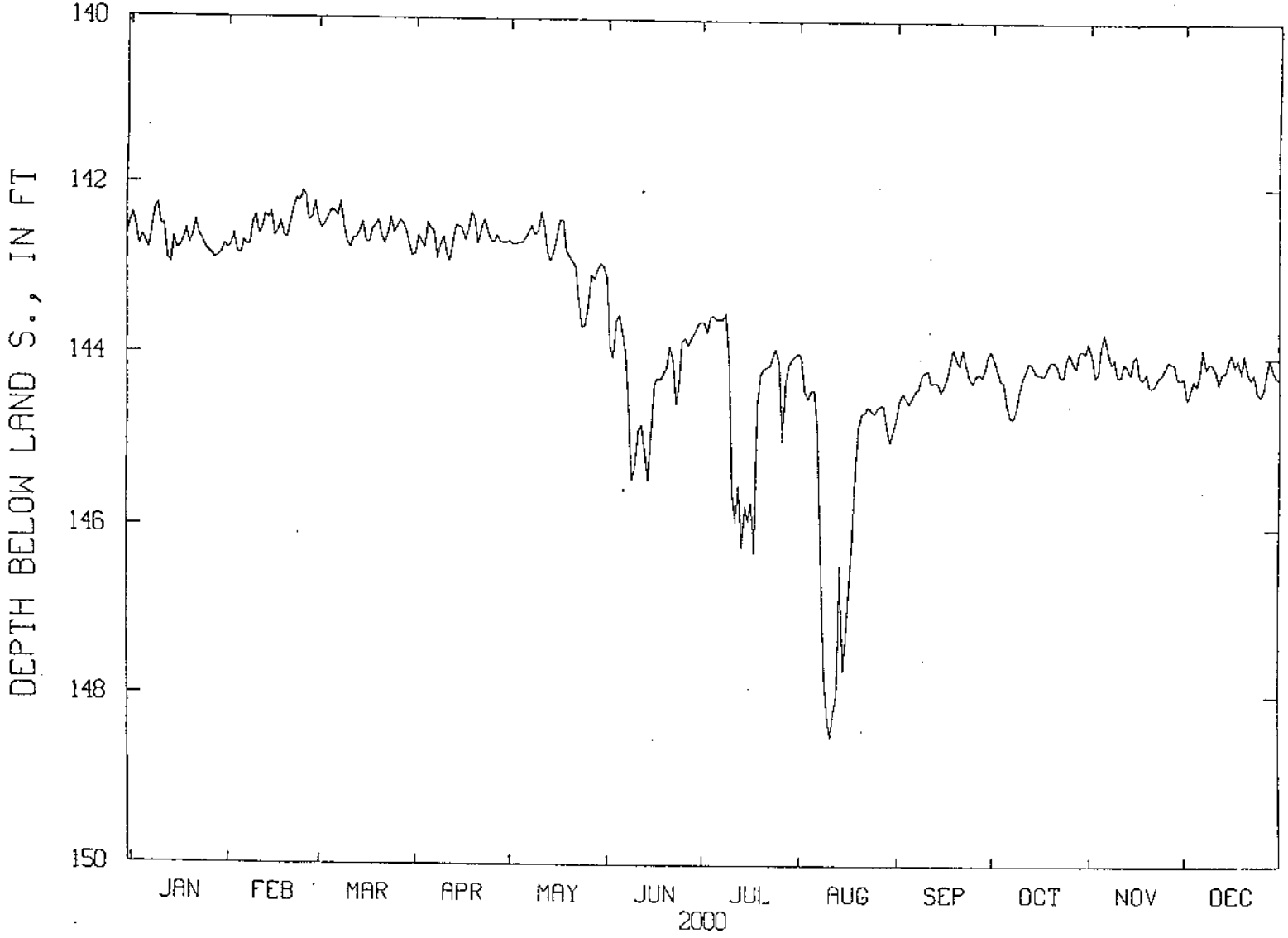
1/1/90 - 12/31/94



Princeton Recorder Well



—— PRINCETON 403400096435501 7N 6E15DCCC1 (DAILY DEPTH BELOW LAND SURFACE (WATER LEVEL) (FEET))



PRINCETON WELL 403400096435501 7N 6E15DCCC1
MEAN DAILY DEPTH BELOW LAND S. (FT), ,FROM EDL